State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
Northern Region – Timberland Conservation Program
1625 South Main Street
Yreka, CA 96097
www.wildlife.ca.gov

EDMUND G. BROWN JR., Governor
CHARLTON H. BONHAM, Director

September 6, 2018

Jennifer Norris
U.S. Fish and Wildlife Service
1655 Heindon Road
Arcata, California 95521-4573

Dear Ms. Norris:

Subject: California Department of Fish and Wildlife Review of the Green Diamond Resource Company Draft Forest Habitat Conservation Plan and Draft Environmental Impact Statement

The California Department of Fish and Wildlife (CDFW) appreciates the opportunity to review and provide comments for the Green Diamond Resource Company (GDRCo) draft Forest Habitat Conservation Plan (FHCP) and draft Environmental Impact Statement (DEIS). Pursuant to California Fish and Game Code section 1802, CDFW has jurisdiction over the conservation, protection, and management of wildlife, native plants, and habitat necessary to maintain biologically sustainable populations. Additionally, CDFW is always a trustee agency under the California Environmental Quality Act (CEQA; Pub. Resources Code § 21000, et seq.) when projects may affect fish, wildlife, or their habitats (Cal. Code Regs., tit. 14, § 15386, subd. (a)). As trustee for these resources, CDFW provides the requisite biological expertise to review and comment upon environmental documents and impacts arising from project activities. CDFW submits these comments in its Trustee Agency capacity as well as (CEQA) its role as a non-federal timber harvesting plan review team agency under section 1037.5, subdivision (a) of Title 14 of the California Code of Regulations.

We also provide comments in the spirit of our mission, which, in part, is to manage trustee resources for their ecological values; and our vision of anticipating the future, utilizing sound biological information, and developing partnerships to meet the needs and management of wildlife resources.

CDFW's technical experts were provided opportunities to meet with GDRCo on May 10, June 26, and August 7, 2018. We acknowledge the many challenges confronting conservation of these covered species and support the development of this Habitat Conservation Plan. We appreciate the magnitude of effort invested by GDRCo and your agency aimed at incorporating a substantial amount of information into documents of a comprehensive nature. We understand the biological baseline information reflects several years of data gathering and analysis by GDRCo staff. Encroaching populations of Barred Owls pose a significant threat to the viability of northern spotted owls (NSO)

populations in California. GDRCo's efforts to address this issue through the implementation of the FHCP have the potential to provide a significant step toward maintaining the species within California. We recognize these efforts and suggest our comments be reviewed in the context of improving long-term effectiveness of the FHCP's conservation measures in providing improved, fully sustainable habitat conditions for the NSO, fisher, and tree voles (Covered Species).

Comments were crafted by CDFW's technical experts, encouraged by the Northern Region Timberland, Wildlife, and Habitat Conservation Program Managers, and reviewed and supported by Executive level staff in Sacramento and Redding. It is important to note that CDFW staff had minimal opportunity to participate during development of the draft FHCP and DEIS. Subsequently, CDFW was not able to offer protection measures and other comments as these draft documents were being prepared. Therefore, CDFW must rely on this letter as the sole avenue for submitting comments designed to fulfill our trustee agency obligations and ensure that the regulatory authorizations issued by your agency are consistent with the California Endangered Species Act (CESA; Fish & G. Code, § 2080 et seq.) in anticipation of a future request by GDRCo for such a determination.

The comments are provided in Attachment 1, and may be modified in future assessments, pursuant to potential application of California Endangered Species Act (CESA) or CEQA, as more information is presented, disclosed, and/or reviewed. Absence of comment on any particular topic does not necessarily imply agreement. Attachment 2 provides CDFW's specific recommendations based on comments in Attachment 1. Attachment 3 contains a 2007 letter from Dr. Alan Franklin to your agency concerning Habitat Fitness Potential Modeling (FHCP Goal One, Objective 1B), which is referenced in the Attachment 1 comments.

CDFW appreciates the opportunity to participate in your National Environmental Policy Act review of the FHCP and encourages full consideration of these comments and implementation of the proposed changes. We look forward to working with your agency and GDRCo further as this process continues.

Questions regarding this letter or further coordination should be directed to Jon Hendrix, Senior Environmental Scientist (Supervisor) at jon.hendrix@wildlife.ca.gov or (707) 964-1691.

Sincerely,

Joe Croteau
Acting Northern Region Manager

Attachments

1. CDFW Comments on the FHCP
2. CDFW Recommendations
3. 2007 letter from Dr. Alan Franklin to the Service concerning the Habitat Fitness Potential Modeling

cc: Michael Senn, Deputy Assistant Regional Director-Ecological Services
United States Fish and Wildlife Service
2800 Cottage Way, Suite W2606
Sacramento, CA 95825

Neal D. Ewald, Senior Vice President
Green Diamond Resource Company
Post Office Box 1089
Arcata, CA 95518

ec: **United States Fish and Wildlife Service**

Jennifer Norris
Field Supervisor
fw8greendiamondhcp@fws.gov

Kathleen Brubaker
Endangered Species Program Lead
kathleen_brubaker@fws.gov

Lynn M. Roberts
Senior Biologist
lynn_m_roberts@fws.gov

John Peters
Fish and Wildlife Biologist
john_peters@fws.gov

Green Diamond Resource Company

Keith Hamm
Conservation Planning Manager
khamm@greendiamond.com

Redwood National Park

Dave Roemer
Deputy Superintendent Redwood National Park
Dave_Roemer@nps.gov

Leonel Arguello
Natural Resource Manager
leonel_arguello@nps.gov

California State Parks, North Coast Redwoods

Victor Bjelajac,
District Superintendent
victor.bjelajac@parks.ca.gov

Amber Transou
Senior Environmental Scientist (Supervisor)
amber.transou@parks.ca.gov

California Department of Fish and Wildlife

Julie Yamamoto
Acting Chief Deputy Director
julie.yamamoto@wildlife.ca.gov

Chad Dibble
Deputy Director
chad.dibble@wildlife.ca.gov

Richard Macedo
Branch Chief, Habitat Conservation Planning Branch
richard.macedo@wildlife.ca.gov

Isabel Baer
Environmental Program Manager, Habitat Conservation Planning Brach
isabel.baer@wildlife.ca.gov

Joe Croteau
Environmental Program Manager and Acting Northern Regional Manager
joe.croteau@wildlife.ca.gov

Jon Hendrix
Senior Environmental Scientist (Supervisor)
jon.hendrix@wildlife.ca.gov

Ryan Mathis
Senior Environmental Scientist (Supervisor)
ryan.mathis@wildlife.ca.gov

Susan Sniado
Senior Environmental Scientist (Specialist)
susan.sniado@wildlife.ca.gov

Carie Battistone
Senior Environmental Scientist (Specialist)
carie.battistone@wildlife.ca.gov

Lacy Bauer
Senior Staff Counsel
lacy.bauer@wildlife.ca.gov

ATTACHMENT 1:
CDFW COMMENTS ON THE FHCP

1) Habitat Fitness Potential Model

GDRCo's Habitat Fitness Potential (HFP) model (see FHCP Appendix C) is fundamental to the FHCP's conservation strategy for NSOs (Goal One and Objective 1A). The HFP model is also a key element of the FHCP's monitoring of the conservation strategy's effectiveness (Goal Five and Objective 5B).

Goal One of the FHCP is to promote a habitat mosaic across the Plan Area, based on the results of the HFP modeling. Implementation of Goal One is primarily achieved through clear-cut timber harvesting with habitat retention currently required by the Forest Practice Rules and GDRCo's Aquatic HCP, such as retention in Riparian Management Zones (RMZs) and geologically unstable areas (multiple FHCP sections; e.g., Section 5.3.1.1.1). The FHCP projects HFP across the Plan Area and through time and concludes that the distribution of high quality NSO habitat will substantially increase in the Plan Area during the term of the FHCP (e.g., FHCP Map 4-3). Monitoring the effectiveness of this conservation strategy includes a comparison of projected trends in high quality habitat with estimates of abundance of NSOs (FHCP Section 5.3.5.1.1).

The DEIS (Table ES-1) describes the FHCP as having "improved habitat management" based on its application and interpretation of GDRCo's HFP modeling. For example, FHCP Tables ES-1 and 4-3 describe the benefit of Barred Owl removal in the FHCP as allowing "spotted owls to respond favorably to increasing habitat fitness."

Application of HFP Modeling at Large Scales

HFP modeling is conceptual and is intended to help understand relationships between NSO life history traits and habitat characteristics at the territory scale (e.g., within ca. 400–425 acres of the nest: Franklin et al. 2000, Dugger et al. 2005). HFP modeling is not intended to be used for large-scale conservation planning or monitoring (Franklin et al. 2000, Franklin 2007: see Attachment 3). Modeling NSO-habitat relationships at larger scales, such as the FHCP's Owl Management Units (ca. 23,000–56,000 acres) or Plan Area (ca. 357,000 acres), requires accounting for landscape-level considerations that are not included in HFP modeling, such as territory densities, juvenile dispersal, and movements by territory holders (Franklin et al. 2000, Franklin 2007: see Attachment 3). Projection of territory-specific fitness (HFP) to larger scales could produce incorrect results and lead to inappropriate conservation planning (Franklin et al. 2000, Franklin 2007: see Attachment 3). Dr. Alan Franklin (2007: see Attachment 3), who developed this modeling approach for NSOs, made these same points in a publicly-available letter to the Service, when the Service proposed to use his HFP modeling for large-scale

conservation planning in the 2008 NSO Recovery Plan (USFWS 2008). These concerns are not merely academic but rather, are directly relevant to the FHCP's conservation strategy and monitoring for NSOs. For example, avoiding or mitigating take could require retaining different amounts or configurations of NSO habitat than are currently described in the FHCP. Inappropriate use of HFP model outputs for large-scale and long-term monitoring could also lead to incorrect conclusions about the effectiveness of the FHCP as a conservation strategy for NSOs. CDFW recommends the FEIS evaluate the appropriateness of using territory-scale HFP modeling as a basis for the FHCP's large-scale conservation strategy for NSOs. CDFW recommends that the Service consult with a third-party quantitative NSO ecologist with expertise on HFP modeling to inform the FEIS evaluation of this technically complex information. **(Recommendation 1).**

HFP Model Validation

The FHCP proposes to validate the HFP model's use as a basis of its conservation strategy for NSOs by comparing predicted trends in habitat quality to trends in NSO abundance, which will be based on occupancy modeling (FHCP Section 5.3.5). Occupancy and abundance could provide unreliable metrics for validating HFP modeling. For example, high occupancy could occur in territories with high turnover of NSOs, since occupancy is not determined by following the fates of banded individuals (Berigan et al. 2018). Additionally, the FHCP does not describe a strategy for controlling for the effects of Barred Owl presence and removal on occupancy of NSOs, which could confound interpretation of NSO occupancy modeling in relation to validation of GDRCo's habitat projections (e.g., Higley and Mendia 2013, Lesmeister et al. 2016; see CDFW Comment Section 6). Further, without demographic validation, it may be unclear whether areas with relatively high densities of NSOs are population sources or sinks (Van Horne 1983, Pulliam 1988). Survival is likely a more reliable metric of habitat quality and population performance for NSOs than abundance or fecundity, as NSO populations are most sensitive to changes in adult survival (Noon and Biles 1990, Lande 1991), and densities of animals can provide a false picture of habitat quality (Van Horne 1983, Pulliam 1988). The FHCP (Section 5.3.5) states that it would be problematic to validate the HFP modeling projections across the Plan Area using estimates of survival. However, as described above, projection of territory-scale HFP modeling to large landscape scales appears to be inappropriate and may not constitute a valid basis for large-scale conservation planning (Franklin et al. 2000, Franklin 2007; see Attachment 3). CDFW recommends the FEIS evaluate the appropriateness of comparing modeled projections of future HFP to trends in estimated abundance for monitoring the effectiveness of the FHCP's conservation strategy. **(Recommendation 2).**

Implications of HFP Modeling to Territory-Scale Habitat Management

HFP modeling could be useful for informing management of NSOs at the territory scale. The Service (2009) used HFP modeling results, as part of a larger review of the available science, to develop take-avoidance guidance (habitat retention guidelines) for NSOs in interior northern California. In contrast, the FHCP contains little information about the potential implications of HFP modeling for habitat management at the territory scale. For example, the summary of HFP modeling in FHCP Appendix C describes the importance of habitat edge created by clear-cut harvesting but does not describe the size or configuration of nesting/roosting habitat patches in territories that support high fitness. Published HFP modeling in northwestern California and southwestern Oregon indicates that territories supporting high fitness have relatively large, contiguous patches of nesting/roosting habitat with highly convoluted shapes (Franklin et al. 2000, Olson et al. 2004, Dugger et al. 2005; see Figure 1). This habitat configuration provides a balance of both habitat edge, associated with high reproduction, and large amounts of interior mature or old forest, associated with high survival (Franklin et al. 2000). In a highly fragmented landscape in southwestern Oregon, where large contiguous patches of nesting habitat were not available, the survival of NSOs was positively associated with larger numbers of closely spaced (i.e., clustered) patches of nesting habitat (Schilling et al. 2013).

In contrast with the implications of published research on the habitat relationships of NSOs, the FHCP's conservation strategy relies to a large degree on retention of relatively narrow Riparian Management Zones (FHCP Section 5; e.g., see Figure 2) and small geologically unstable areas, which may often provide high amounts of habitat edge but little or no interior nesting/roosting habitat. While patches of nesting/roosting habitat with those shapes potentially support reasonably high occupancy or reproduction on GDRCo land, they may not support high survival (see GDRCo results in Dugger et al. 2016). Like other HFP modeling studies, GDRCo's HFP modeling indicated that survival of NSOs was positively influenced by nesting habitat. However, the nesting habitat variable in the modeling (*nest_HSI*) was averaged within a 279-acre buffer around each NSO site, and the actual sizes, shapes, or clustering of nesting habitat patches in territories with high survival or fitness were not reported. Given that NSO populations are most sensitive to changes in adult survival (Noon and Biles 1990, Lande 1991), the FHCP should include more consideration of the habitat conditions associated with high survival and fitness, rather than primarily focusing on conditions associated with high occupancy and fecundity. CDFW recommends the FEIS evaluate the HFP modeling's implications for territory-scale conservation of NSOs in the Plan Area; for example, in regard to the size, shape, and clustering of nesting/roosting habitat patches associated with high survival and fitness. **(Recommendation 3).**

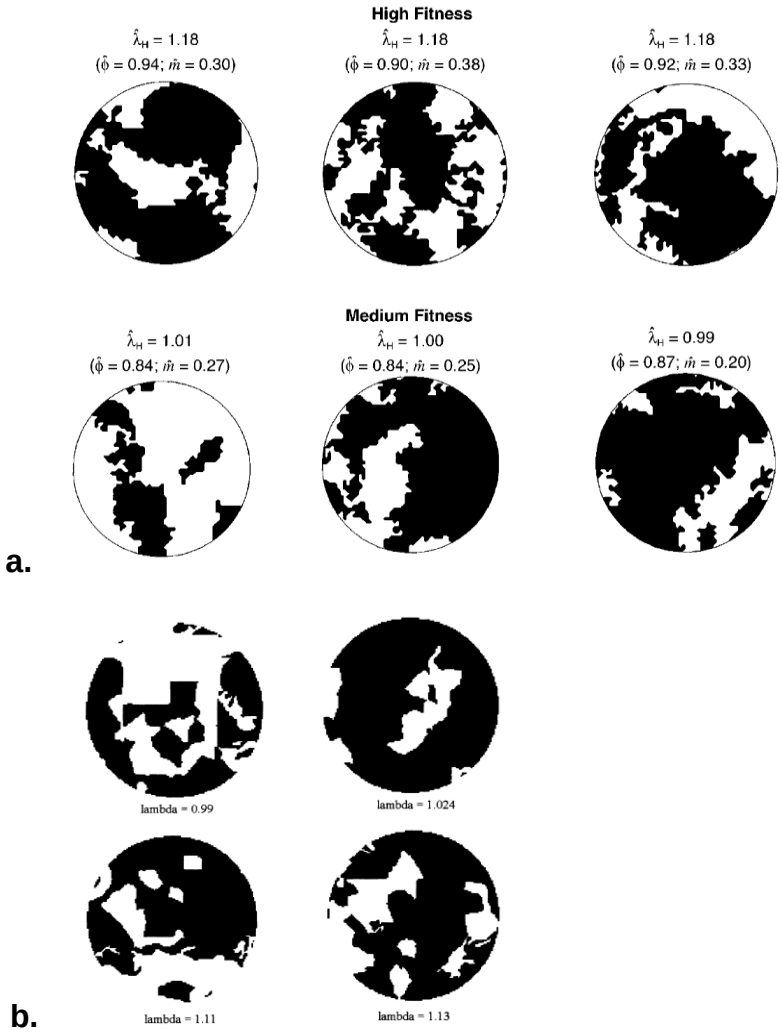


Figure 1. Examples of nesting/roosting (mature and old forest) habitat (black) configuration and all other habitat classes (white) in NSO territories with HFP ≥1 (i.e., that support moderate to high fitness) in studies in Willow Creek, CA (a: Franklin et al. 2000) and southwestern OR (b: Olson et al. 2004). Also see Dugger et al. (2005). Compare Figure 1 with Figure 2 showing an example of “dendritic” Riparian Management Zones around an NSO site on GDRCo land.

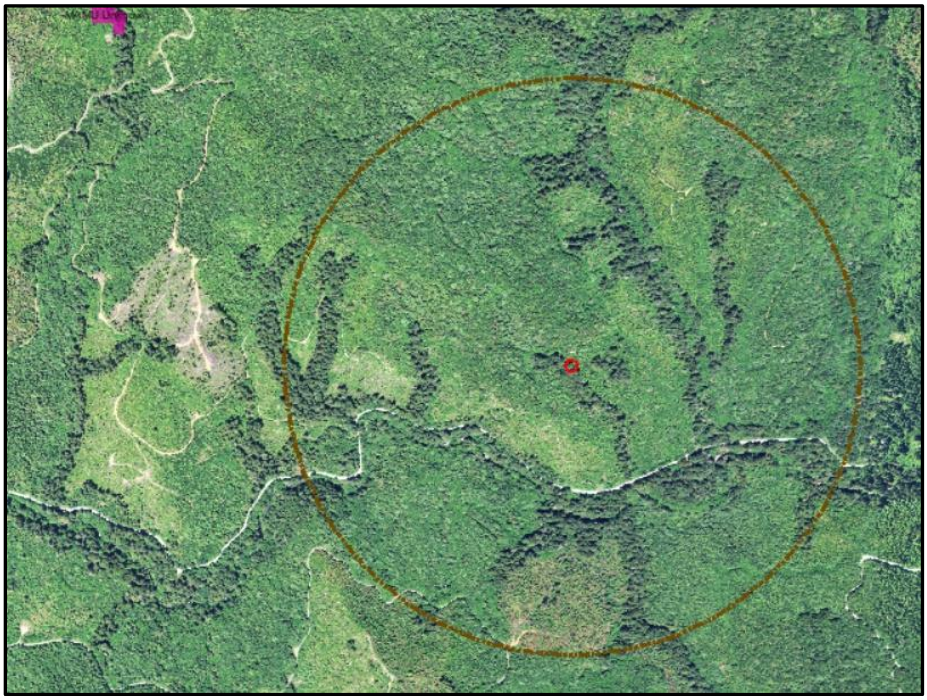


Figure 2. “Dendritic” post-harvest Riparian Management Zone habitat retention within 0.5 mile (circle) of an NSO site on GDRCo land. Compare with Figure 1 showing the configuration of nesting/roosting habitat in territories with high Habitat Fitness Potential.

HFP Modeling Results Concerning Set-Asides

GDRCo's modeling indicated that the highest HFP occurred in territories that were located in or nearby set-asides (FHCP Appendix C, Chapter 4). The positive influence of set-asides was evident in modeling of both survival and fecundity. For example, 18 of the top 20 survival models contained set-asides as a covariate (see FHCP Appendix C, page C-188). GDRCo noted that the apparently strong positive influence of set-asides on fecundity was likely underestimated due to a bias in the protocol. GDRCo interpreted the results of the fecundity modeling in light of this bias as follows (FHCP Appendix C, page C-168): "Our interpretation of this trend was that owls in set-asides with no harvest had greater habitat stability relative to those owls in the matrix where take displaced selected owl pairs. Presumably we were more likely to find females in set-asides relative to the matrix regardless of their reproductive status, which would have biased the fecundity estimates." In the same paragraph, they further stated, "this would suggest that owls within or near set-asides have the highest fecundity and the matrix owls have the lowest fecundity." GDRCo's modeling report (FHCP Appendix C, page C-172) concluded, "we believe our habitat fitness model should be regarded as a testable hypothesis with particular emphasis on the relationship between set-asides and owl demographic rates on managed timberlands."

In contrast with the HFP modeling's substantial support for the importance of set-asides to NSOs on GDRCo's ownership, FHCP Section 4, describes a post-hoc analysis suggesting that set-asides had a neutral or slightly negative influence on survival (Section 4.3.1.3). Yet, it states (page 4-14) "...the results should be interpreted with caution. Furthermore, forcing a single habitat-related variable into a model without the potential for other interacting habitat variables to enter the model is questionable and may have produced spurious results." A more complete review of that modeling effort and the HFP modeling (FHCP Appendix C, Chapter 4), along with review of the 2016 demographic meta-analysis (Dugger et al. 2016), indicates that both take, and harvesting of set-asides (no-take reserves), could negatively impact the Plan Area's NSO population (see CDFW Comment Section 7, below). CDFW recommends the FEIS evaluate the FHCP's conservation strategy (e.g., "dendritic" habitat retention) and mitigation for take (Dynamic Core Areas instead of set-asides) in light of GDRCo's research showing the importance of set-asides to NSOs in the Plan Area, including the HFP modeling. If confusion about the importance of set-asides to NSOs in the Plan Area cannot be resolved in the FEIS, CDFW recommends the FHCP be amended to state that set-asides will be retained as reserves for NSOs until the HFP modeling is appropriately validated. **(Recommendations 4 and 5).**

2) Habitat Thresholds for Take Analysis and Dynamic Core Areas

The FHCP must avoid and minimize the risk of taking NSOs and mitigate incidental take to the degree feasible. Prior to HFP model validation, GDRCo will use 89 acres of forest ≥46 years and 233 acres of forest ≥31 years within 0.5 mile (502 acres) of NSO Activity Centers (ACs) as thresholds below which timber harvesting triggers accounting and monitoring of take (FHCP Section 5.1.2.1). The FHCP (Section 6.2.2.1) describes forest ≥46 years as "nesting and roosting habitat" and forest ≥31 years as "foraging habitat plus some roosting and nesting". Those minimum habitat amounts (89 and 233 acres) are also used as criteria for selecting replacement Dynamic Core Areas (DCAs) (FHCP Section 5.3.1.4.1), which are the FHCP's "primary mitigation strategy for NSO" (FHCP page 5-22; also DEIS Section 2.1.2.7).

Origin of the FHCP's Habitat Thresholds

The FHCP's 89- and 233-acre habitat thresholds were retained from the 1992 HCP. The 1992 HCP derived these thresholds by subtracting one standard deviation (SD) from the mean amounts of forest ≥46 years and ≥31 years within 0.5 mile (502 acres) of 60 NSO sites on GDRCo's ownership (Folliard 1993). The 1992 HCP (see Simpson 1992, Chapter 2.G and Appendix D) supported the choice of the mean -1SD for determining take analysis thresholds through a calculation of habitat available in 3 large survey areas with different densities of NSOs. To support its choice of the mean -1SD, the 1992 HCP first calculated: (a) crude densities of NSOs (high, low, no owls) in 3 survey

areas (ca. 46,500–75,500 acres in size) and (b) the proportion (0.0–1.0) of each of those 3 areas in various forest age classes. It then multiplied those proportions by the size of an NSO territory (502 acres) to get an estimated amount of each forest age class that would occur in NSO territories. For example, the proportion of forest ≥31 years (foraging habitat plus some roosting and nesting) in the low-density survey area multiplied by the territory size (502 acres) was 136 acres. Because the result of this calculation was lower than the mean -1SD in Folliard's (1993) study (233 acres), the 1992 HCP (Appendix D, no page number) concluded a threshold based on the mean -1SD "represents a high, conservative threshold."

The calculation to support the choice of the mean -1SD for determining take analysis thresholds in the 1992 HCP (which is retained in the FHCP), appears to be flawed in that it is based on multiple incorrect assumptions. The 1992 HCP's support for selection of the mean -1SD was based on a crude calculation of averaged habitat conditions across very large landscapes (45,500–75,500 acres), which is unlikely to have reflected actual habitat conditions in those landscapes (i.e., due to ecological variation and timber harvest history). It is also based on an assumption that NSOs in those landscapes randomly select their activity center locations. This assumption appears to be inconsistent with decades of research on NSOs (since at least the mid-1970s), including Folliard's (1993) own thesis, which showed territory-scale habitat selection by NSOs on GDRCo land. As described below, NSOs on GDRCo land (e.g., Folliard et al. 2000) and elsewhere (e.g., Hunter et al. 1995, Ripple et al. 1997, Gutiérrez et al. 1998, Meyer et al. 1998, USFWS 2011a Appendix C) typically locate their territories in areas with relatively high concentrations of suitable habitat, rather than randomly on the landscape.

The FHCP and 1992 HCP's habitat thresholds (mean -1SD) represent the lower end of habitat conditions in NSO territories in Folliard's (1993) thesis. If Folliard's (1993) data were normally distributed (i.e., distributed in a bell-shaped curve), the mean -1SD would represent the lowest 16% of his sample, in terms of amounts of habitat (see Figure 3). Although Folliard's (1993) data were likely not perfectly normally distributed, the mean -1SD represents the habitat conditions in the lower portion of his distribution. Folliard (1993) found evidence of territory-scale selection by NSOs for habitat ≥31 years and ≥46 years but did not relate amounts of those habitat classes to habitat quality or take. In the absence of such information (i.e., in 1992), it would be more conservative, from the standpoint of avoiding take, to use Folliard's (1993) mean values, rather than the mean -1SD. The mean amount of forest ≥46 years in Folliard's (1993) sample is 239 acres or 48% of the estimated territory. In their publication of Folliard's (1993) master's research, Folliard et al. (2000, page 83) came to the same conclusion, stating “our data suggested that, to maintain Northern Spotted Owls in managed forests of the redwood zone, ≥50% of the landscape or area surrounding nests should be in forests >45-yr old.”

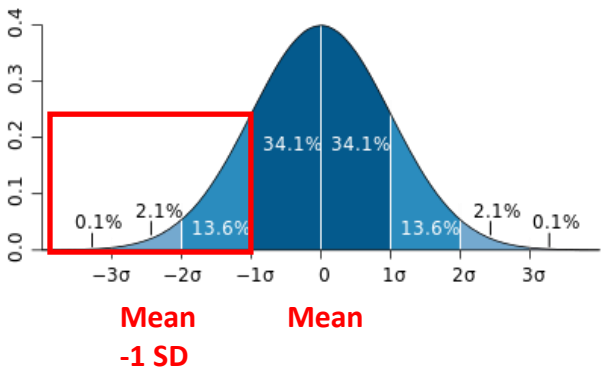
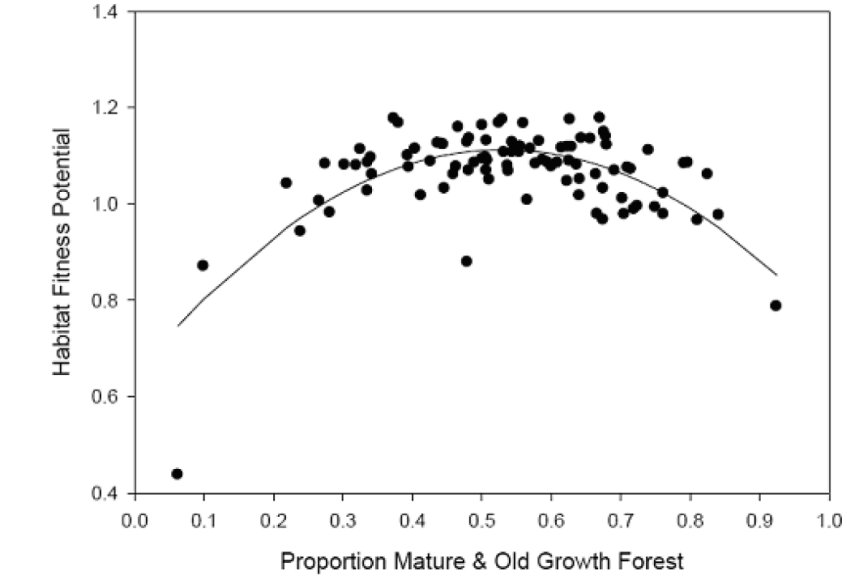


Figure 3. A hypothetical normal distribution showing the percentage of the sample or population relative to the mean and the mean minus one standard deviation (mean -1SD). Note that, a take analysis threshold of the mean -1SD in this hypothetical example would mean that take would not be analyzed until habitat amounts were harvested to levels below that found in more than 84% of territories.

Broader Scientific Review of the FHCP's Habitat Thresholds

More direct evaluations of habitat quality for NSOs at the territory scale occurred in published Habitat Fitness Potential (HFP) modeling studies in northwestern California (Franklin et al. 2000) and southwestern Oregon (Dugger et al. 2005). Those studies found that NSO territories (413 and 425 acres) supporting high fitness (HFP ≥1) consisted of approximately 40–60% nesting/roosting habitat (reviewed in USFWS 2009; see Figure 4). Across interior northwestern California, NSO sites with high occupancy (≥70%) consisted of about 48% nesting/roosting habitat at an estimated territory or core area scale (500 acres) and the highest probability of occupancy occurred with 60–70% of the area in nesting/roosting habitat (Zabel et al. 2003). The central tendency of several studies of habitat use or selection by NSOs in northwestern California and southwestern Oregon provides further support for a take threshold for nesting/roosting habitat of approximately 50% of the estimated territory or core area (Hunter et al. 1995, Ripple et al. 1997, Gutiérrez et al. 1998, Meyer et al. 1998; reviewed in USFWS 2009; see Figure 4). This contrasts with the FHCP's 18% (89 acres) nesting/roosting habitat threshold for analyzing take and selecting DCAs, and the even lower amount of nesting habitat actually retained in DCA no-harvest areas (see Figure 5; also see CDFW Comment Section 5, below). CDFW recommends the FEIS evaluate the appropriateness of 89 acres as a habitat threshold for reporting and analyzing take and for selecting and protecting DCAs. If a take threshold of 89 acres of nesting/roosting habitat is not supported by the best available science, the FHCP should be amended to change that take threshold to one that is supported. **(Recommendations 6 and 7).**



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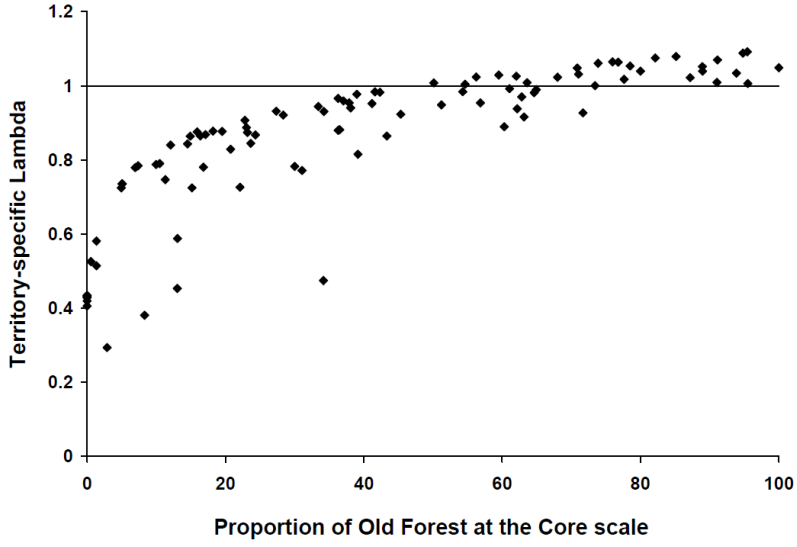


b.

Figure 4. Amounts of nesting/roosting habitat in NSO territories (ca. 413 and 425 acres, respectively) with HFP ≥1 in studies in Willow Creek, CA (a: Franklin et al. 2000) and southwestern OR (b: Dugger et al. 2005) (from USFWS 2009).

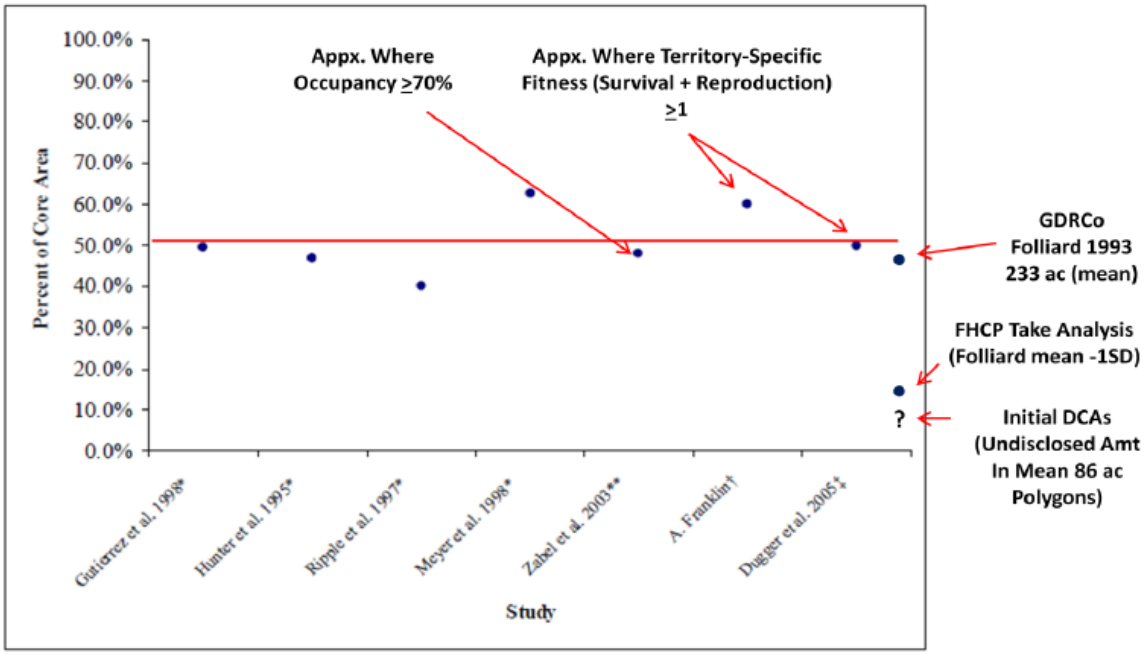


Figure 5. Percentage of nesting/roosting habitat in estimated NSO territories in northwestern California and southwestern Oregon, with the central tendency among these studies shown as a red line (from USFWS 2009). CDFW added the mean from Folliard (1993) on GDRCo land and the FHCP's take analysis and DCA selection threshold (18% = 89 acres).

The amount of foraging habitat that should be used as a threshold for avoiding or analyzing take and selecting DCAs is less clear than for nesting/roosting habitat. Estimated NSO core areas (500 acres) across interior northwestern California with high occupancy (≥70%) consisted of about 30–40% foraging habitat, in addition to 60–70% nesting/roosting habitat (Zabel et al. 2003). In other words, high occupancy occurred when nearly the entire estimated territory or core area consisted of suitable habitat for NSOs. In contrast, research has suggested that NSOs on GDRCo land select territories containing a variety of forest age classes that are thought to provide a mix of nesting/roosting, foraging, and woodrat habitats (e.g., Thome et al. 1999, Folliard et al. 2000; see FHCP Appendix C). GDRCo's HFP modeling report in FHCP Appendix C does not describe the amount of foraging habitat or total amount of suitable (i.e., foraging + nesting/roosting) found in NSO territories supporting high fitness. However, this information is likely available and could potentially be provided to the Service to assist its evaluation of the FHCP's take thresholds. CDFW recommends the FEIS evaluate the appropriateness of 233 acres of suitable habitat (foraging + some nesting/roosting) as a take threshold in the FHCP. If a take threshold of 233 acres of suitable habitat is not supported by the best available science, the FHCP should be

amended to change that take threshold to one that is supported. **(Recommendations 6 and 7).**

3) Habitat Definitions for Take Analysis and DCA Protection

The FHCP must avoid and minimize the risk of taking NSOs and mitigate incidental take to the degree feasible. Prior to model validation, GDRCo will use 89 acres of forest ≥46 years and 233 acres of forest ≥31 years within 0.5 mile (502 acres) of NSO sites as thresholds below which timber harvesting triggers accounting and monitoring of take (FHCP Section 5.1.2.1). The FHCP (Section 6.2.2.1) describes forest ≥46 years as "nesting and roosting habitat" and forest ≥31 years as "foraging habitat plus some roosting and nesting". Those habitat thresholds and definitions are also used as criteria for selecting replacement DCAs (FHCP Section 5.3.1.4.1). DCAs are the FHCP's "primary mitigation strategy for NSO" (FHCP page 5-22; also DEIS Section 2.1.2.7). The key protection for NSOs in DCAs is the delineation of a core, no-harvest patch of forest ≥46 years.

Foraging Habitat on GDRCo's Ownership

GDRCo found that, while foraging and engaged in other nocturnal activities, radio-tracked NSOs strongly selected, and were primarily found in, patches of forest ≥41 years, that were located low on slopes and adjacent to young forest (6–20 years) (FHCP Appendix C, Chapter 2; also McDonald et al. 2010). In regard to this finding GDRCo (FHCP Appendix C, page C-6) stated "in other words, at night spotted owls on GD's ownership were most likely to be found in older more complex forest stands that were in close proximity to younger stands (i.e., stands with more potential prey)." A similar study in the Klamath region, where woodrats are also the predominant prey, likewise found that foraging NSOs strongly selected mature, structurally-complex forest, with a shrub or hardwood component, and located near streams (Irwin et al. 2012).

Nesting Habitat on GDRCo's Ownership

GDRCo also evaluated nest site selection among a large sample of NSOs (182 nests in 71 territories) (FHCP Appendix C, Chapter 2). That study found the relative probability of locating a successful nest in a managed stand greatly increased with stand age and open edge density within 0.37 mile of the nest (see Figure 6). Nest site selection was greatest in managed stands with substantial components of residual old-growth basal area (55%) and hardwood basal area (30%), as well as a large amount of nocturnal habitat within 0.25 mile (see Figure 6). Concerning these findings, GDRCo (FHCP Appendix C, page C-52–53) stated "the relationship with stand age and residual old growth basal area in the stand indicated that spotted owls were selecting for the oldest stands and stands with a large residual component in managed forests. This is

consistent with numerous previous studies that have shown selection for large decadent trees during nesting (Folliard et al. 2000, Courtney et al. 2004)."

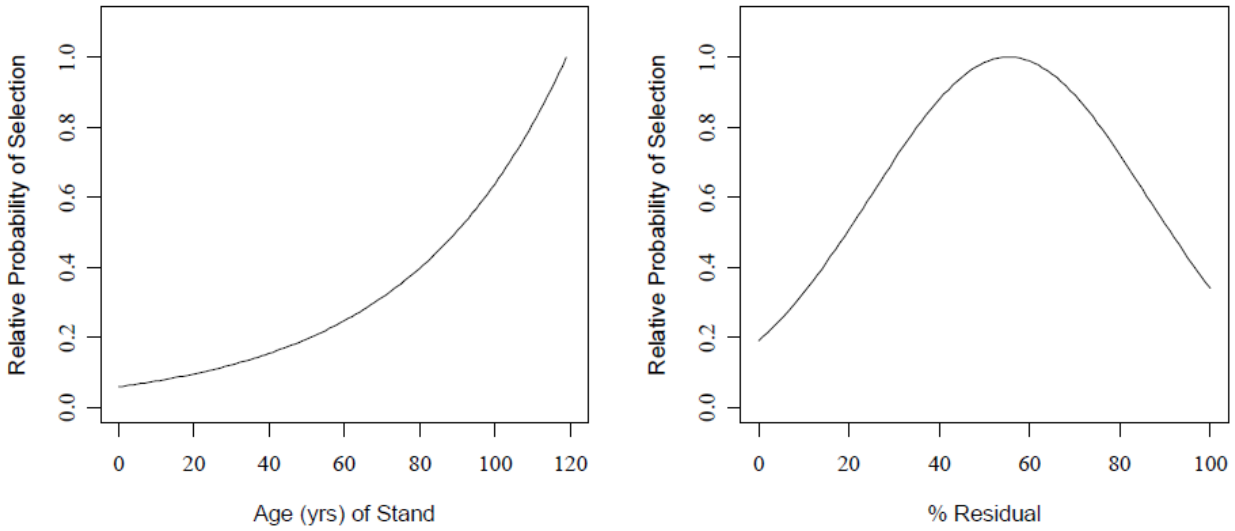


Figure 6. Relative probability of an NSO selecting a point in the landscape for a successful nest in a managed stand on GDRCo land, as a function of the stand age (left) and % residual (right) (from FHCP Appendix C, Chapter 2).

FHCP Habitat Categories Compared with NSO Habitat on GDRCo's Ownership

Research on GDRCo land has shown that NSOs selectively nest and forage in structurally complex, mature stands, located nearby or adjacent to younger forest that provides habitat for woodrats. The FHCP's habitat definitions do not appear to be congruent with these findings, as they have lower age thresholds than habitats both frequently and selectively used by NSOs on GDRCo's ownership, and do not explicitly incorporate structural characteristics important to the population. The FHCP's conservation strategy for NSOs relies to a large degree on increasing ages of areas required for retention under the FPRs and Aquatic HCP, particularly RMZs and geologically unstable areas. Some retention areas already exist, others will be added early in the Plan's term, and still others will be added later in the Plan's term. Therefore, some of the RMZs and other retention areas will be younger than the age classes selectively or typically used by NSOs in the Plan Area.

The FHCP could include additional habitat categories for analyzing and reporting take, to ensure that sufficient total amounts of habitat are retained and that a proportion of that habitat is higher-suitability. The Service's (2009) guidance for take-avoidance in the interior of northern California, for example, calls for retention of 250 acres of nesting/roosting habitat, 100 acres of which should be high-quality nesting/roosting habitat. The purpose of retaining a portion of nesting/roosting habitat as "high-quality

nesting/roosting habitat" was to ensure sufficient retention of forest that more closely resembles actual nest and roost locations, as well as a sufficient total amount of nesting/roosting habitat. CDFW recommends the FEIS evaluate whether additional habitat categories should be used in the FHCP for reporting take and protecting DCAs. If additional categories should be used, the FHCP should be amended to reflect that. **(Recommendations 8 and 9).**

The FHCP's habitat definitions for NSOs do not specifically address the structural characteristics of NSO habitat. Retention of habitat elements, such as large, decadent trees, is part of the FHCP's mitigation for all three covered species and is Goal Two of the FHCP. However, that retention does not appear to sufficiently ensure that nesting/roosting and foraging habitat retained for NSOs is structurally complex, or that nesting habitat contains large numbers of residual trees when available. The importance of residuals should be particularly addressed when selecting among potential DCAs, which could have similar sized patches of forest ≥46 years but differ substantially in structural complexity and numbers of residuals. See CDFW Comment Section 4, below for recommendations concerning retention of residual trees.

4) Retain and Recruit Targeted Habitat Elements

Goal Two of the FHCP is to retain and recruit targeted habitat elements (FHCP Section 5.2.2.2). These habitat element commitments are a component of the mitigation and minimization measures for NSOs (FHCP sections 5.3 and 7.2.2). The objective in the FHCP is to retain these habitat elements in Riparian Management Zones (RMZs), geologically unstable areas, and habitat retention areas (HRAs), and through implementation of the Terrestrial Retention of Ecosystem Elements (TREE) program in Timber Harvesting Plans (THPs).

Research on NSO Nest Stands and Structures

Throughout their range, NSOs selectively use either structurally complex, decadent older forest or younger forest with residual older-forest structures (reviewed in Courtney et al. 2004 and USFWS 2011a; e.g., Blakesley et al. 1992, Solis and Gutiérrez 1990, LaHaye and Gutiérrez 1999, FHCP Appendix C). The characteristic structure of nesting/roosting habitat likely serves a variety of functions for NSOs. NSOs may nest and roost in older, denser forests because it tends to provide a more moderate, stable microclimate compared with other kinds of forests. NSOs are less able to dissipate body heat than other owls and appear to compensate by nesting and roosting in relatively cool, humid sites (Barrows 1981, Ganey et al. 1993, Ting 1998, Weathers et al. 2001). NSOs also appear to use dense, multilayered canopies for protection from cold, wet weather (Forsman et al. 1984, North et al. 2000), which can negatively impact their fitness (Franklin et al. 2000, Dugger et al. 2005, 2016). NSOs may also prefer nesting

and roosting in denser forest because it provides visual screening from predators (Carey 1985, Buchanan et al. 1995). As described in CDFW's comments above (CDFW Comment Section 3), the habitat definitions used in the FHCP's habitat thresholds for take analysis, and for selecting and protecting DCAs, are based solely on age and do not require retention of structural characteristics important to NSOs.

NSOs may partly favor older, more decadent forest for nesting because it frequently contains suitable nest structures. Nests are usually located in older, larger-diameter, deformed, decadent, or diseased trees containing cavities, broken tops, or platforms (Forsman et al. 1984, Hershey et al. 1998, North et al. 2000; FHCP Appendix C, Chapter 3). Platform nests appear to be more prevalent in stands where large or old trees are lacking (Folliard 1993, Hershey et al. 1998). Approximately 52% of NSO nests on GDRCo land were on platforms (Appendix C, Chapter 3). However, NSOs typically nest in larger, older trees when available, which may provide larger limbs for platforms or development of other nest structures. LaHaye and Gutiérrez (1999) found that nest trees in California were, on average, at least 288 years-old (SD = 129 years). The bole of broken-top nest trees in California had broken an average of 135 years (SD = 73 years) prior to the study, and 55% had broken more than 100 years prior (LaHaye and Gutiérrez 1999). Defective trees are also important to fisher and tree voles, which are covered by the FHCP. For example, 71% of tree vole nests (for which the structure was determined) were in defective trees (e.g., broken or forked tops; FHCP Appendix C, Chapter 3).

Research on GDRCo land indicates that NSOs on the company's ownership, like NSOs throughout their range, selectively nest in older stands and in stands with older-forest structures. GDRCo evaluated nest site selection among a large sample of NSOs (182 nests in 71 territories) (FHCP Appendix C, Chapter 2). That study found the relative probability of locating a successful nest in a managed stand greatly increased with stand age and open-edge density within 0.37 mile of the nest (see Figure 6). The probability of locating a successful nest was greatest in stands with approximately 55% basal area of residual older trees, 30% hardwood basal area, and a large amount of nighttime activity habitat (typically, forest $\geq$41 years) within about 0.25 mile.

Folliard (1993) similarly found that residual older trees were important to NSOs on GDRCo land. In his study, NSOs nested in relatively young stands (ca. 35–40 years) if there was a small cluster of residual older or larger trees that provided a nest site. Typically, a patch of residual trees was about 1.2–4.9 acres. Folliard (1993) observed "...in some cases, a residual nest tree was the only large tree in a stand of very young second growth. In stands such as those, the absence of residual trees could preclude nesting in the area." FHCP Appendix C (Chapter 3) reported that 62% of pairs on GDRCo land nested in stands with residual, older trees, compared with 38% in even-aged stands. Ninety percent of hardwood-dominated nest stands contained residual trees. Reproductive success of NSOs on GDRCo land was positively associated with

residual trees (Thome et al. 1999). Modeling indicated that, at the scale of about 124 acres, approximately 12 residual trees per acre would be needed to support a 95% probability of high yearly reproductive success on GDRCo land (Thome et al. 1999). In contrast with these findings, GDRCo's 2017 NSO Annual Report summarized the average tree retention in THPs per unit (n = 40) as: 1.22 acres HRA, 0.83 snags per acre, and 1.3 green wildlife trees per acre.

Riparian Management Zones

The FHCP (Section 6.2.2.3, page 6-11) states that "in the past, NSO sites on Green Diamond's young managed landscape were most often associated with concentrations of older residual structure, such as trees retained from prior timber harvesting." The FHCP (same paragraph) then hypothesizes that, as the Plan is implemented, NSOs will instead become increasingly associated with RMZs. The FHCP (FHCP Section 5.3.1.1.1, page 5-13) states that RMZs will comprise a "dendritic network of intact forests that will become increasingly older" (e.g., Figure 2; see CDFW Comment Section 1). The FHCP does not require retention of existing older residual trees for NSOs. Rather, the FHCP essentially describes that movement of NSO sites to RMZs will allow harvesting of residual trees, which were previously retained to avoid take or that would have been harvested in take sites (FHCP Section 5.3.1.1.1). RMZs and other retention areas may generally increase in age from about 44 to 94 years-old during the Plan's term. The FHCP states that while stands in this age class are not old-growth, they may develop structures used by birds and mammals for nesting. However, it is unclear whether the kinds of nest structures favored by NSOs, which typically occur in older, more decadent or deformed trees, will be prevalent in RMZs and other retention areas during most of the Plan's term.

FHCP Section 5.3.1.3 describes that RMZs may be selectively harvested once, coinciding with even-age harvesting of the adjacent stand. They may also be lightly thinned to meet wildlife objectives, and trees may be harvested to create cable corridors for harvesting in adjacent units. When RMZs are entered for selection, GDRCo could choose to harvest residual older trees and other trees with particular commercial value if they do not score out as "wildlife trees" (see below). NSOs on GDRCo land strongly select nest stands consisting of a large proportion of older residual trees (see Figure 6). The FHCP's conservation strategy for NSOs largely depends on RMZs providing the best future habitat for the species (FHCP Goal One). However, the FHCP contains no enforceable measures to prioritize leaving residual trees in RMZs for NSOs. Residual trees may only be retained in RMZs incidentally to canopy cover, bank stability, and conifer density requirements (FHCP Appendix D). Since the RMZ prescriptions were developed to protect aquatic resources, it is unclear how the limited harvesting in the RMZ will consider resource values for terrestrial species like NSOs, fisher, and tree voles. CDFW recommends the FHCP be revised to include enforceable language to prioritize the retention of the highest scoring trees (Appendix E, page 11, Live Tree

Retention Scorecard and Definitions) when selectively harvesting in RMZs. Residuals (defined in Appendix E, page 12) will be prioritized over non-residuals when they meet the same scorecard criteria. **(Recommendation 10).**

Terrestrial Retention of Ecosystem Elements (TREE)

A THP unit that has any acreage of RMZ will not be required to have any additional green tree retention, besides hardwood areas and trees that are ≥7 on the TREE scorecard. The TREE program is the primary mechanism for retaining and recruiting late seral structure in the Plan Area (FHCP Section 5.3.2). The TREE program includes a scorecard designed with points for tree size and each structural feature. Trees are retained if they score out ≥7, which means they are typically large in size (≥30 inches for conifers or ≥18 inches for hardwoods = 3 points) and have a combination of other structural features that range from 1 to 4 points each. CDFW has noted that, in practice, trees must often be large-diameter and have an obvious cavity to score sufficiently high for retention as a wildlife trees under the TREE program. Large, decadent trees, with complex structure often fail to meet the scorecard standards.

There are different retention requirements for conifer- or hardwood-dominated stands when a unit lacks riparian or geological retention. Conifer-dominated areas must retain scorecard trees ≥7, one conifer per acre, and two hardwoods per acre. The retention may be a combination of HRAs, scattered trees, or clumps. Hardwood-dominated areas must retain scorecard trees ≥7, a 0.5-acre HRA, and two hardwoods per acre. The intent for HRAs is to be placed in high value wildlife areas, defined as having large snags and decadent hardwoods, with low economic value (FHCP Section E.1.3.2). However, HRAs can be harvested as long as 70% overstory canopy cover is retained.

The TREE program outlines that trees exhibiting described habitat elements will be prime candidates for green tree retention, and that candidate tree selection should be based on retaining defective or poorly formed trees. A concerted effort will be made to retain all snags (FHCP Section 5.3.2). FHCP Appendix E (page 16) for Candidate Tree Selection states “retain trees with the average diameter equal to or greater than the average diameter of trees in the THP area.” THP area is not defined and CDFW is concerned that this could include areas outside the THP boundary. CDFW recommends defining “THP area” in the FHCP or delete “area” from this sentence.
(Recommendation 11).

While scorecard trees ≥7 are the first candidates for green tree retention, they are not always sufficiently present on the landscape and the green tree retention requirements are met with other trees that fail to meet the scorecard standard. Appendix E (TREE) defines several key wildlife features that have high value to NSO and other wildlife, such as residual trees, crown features, ledges or platforms, hollows, cavities, etc. Trees with these features may exist in a THP unit, not meet the scorecard tree standard (≥7 points)

and may not be prioritized in green tree retention. CDFW recommends revising the FHCP to make it an enforceable standard to prioritize the highest scoring trees (Appendix E, page 11 Live Tree Retention Scorecard and Definitions) when choosing green tree retention (HRA's, tree clumps, or scattered trees). Residuals (defined in Appendix E, page 12) will be prioritized over non-residuals when they meet the same scorecard criteria. **(Recommendation 12).**

The FHCP does not require the retention of NSO nest trees. In FHCP Appendix F (page 10) it states, "if a nest is found, the nest tree will be marked." Since the NSO nest trees once provided a suitable structure for NSO to nest, it should be retained indefinitely for future use by NSOs or other covered species. CDFW recommends the Service revise to FHCP to state that "if a nest is found, the nest tree will be marked and retained." **(Recommendation 13).**

Evaluation and Effectiveness Monitoring

Research on GDRCo's ownership has shown that individual older, decadent, or deformed trees, patches of older residuals, and total basal area of older residual trees in the stand are important to nesting NSOs, in terms of both habitat selection and reproductive success (reviewed in FHCP Appendix C). However, there is no enforceable requirement to retain residual trees in the Plan Area, even within RMZs, which are at the center of the FHCP's conservation strategy for NSOs (FHCP Goal One). CDFW is concerned that important habitat elements for NSOs will be lost on the landscape without clear, enforceable language to retain them at a density that is appropriate for conservation of the species, and to prioritize them for retention over younger trees. CDFW recommends the FEIS compare the kinds of structural retention supported by researchers on GDRCo's ownership and elsewhere with the FHCP's requirements for retention of targeted habitat elements (i.e., TREE) **(Recommendation 14)**. For example, the kinds of forest structure resulting from retention in HRAs and under the TREE program could be compared with Folliard's (1993) finding that, based on average values in his study, stands with adequate structure for nesting NSOs on GDRCo land, would likely have about 45 trees/acre in the 11–20 inches DBH size class and 20 trees/acre in the 21–35 inches size class. A requirement of the current NSO HCP is for GDCRo to report pre- and post-harvest estimates of snags and residual trees in timber harvesting plans in the annual report (Simpson 1992, page 202). CDFW recommends the FEIS use these data to analyze the rate of loss of residual trees in THPs since the TREE program's implementation in order to evaluate the effectiveness of the TREE program in retaining this critical element for NSOs under the FHCP **(Recommendation 15)**. CDFW recommends adding enforceable language to the FHCP for GDRCo to monitor for the effectiveness of the tree retention standards (e.g., TREE program) for FHCP Goal Two and report the results to the Service **(Recommendation 16)**.

5) Selection and Protection of Dynamic Core Areas (DCAs)

Goal One of the FHCP is to promote a habitat mosaic across the Plan Area (see CDFW Comment Section 1), with "added emphasis on protection for highly productive NSO sites" (FHCP sections 5.1.1 and 5.3.1). Objective 1B of the FHCP is to "maintain highly functional NSO nesting sites distributed throughout the Plan Area" in the form of DCAs (FHCP Section 5, page 5–6). DCAs are "dynamic" in that the FHCP expects the location of the best NSO sites to change during the life of the Plan and because GDRCo can replace DCAs over time (FHCP Section 5.1.1). DCAs replace the 1992 HCP's 39 set-asides (reserved areas) as the "primary mitigation strategy" for NSOs in the Plan Area (FHCP Section 5, page 5-21). Under the FHCP, all set-asides defined in the 1992 HCP (13,242 acres total), other than portions of them protected as no-harvest cores in initial DCAs (ca. 89 acres each), will be available for timber harvest (FHCP Section 5). Upon issuance of the incidental take permit (ITP), GDRCo will immediately designate and protect 44 DCAs in the Plan Area (FHCP Section 5). After 5 years from the issuance, the FHCP may replace DCAs because they have fallen below the NSO occupancy and fecundity thresholds, for economic reasons, or to meet other GDRCo objectives (FHCP Section 5).

The DEIS (page 4-18) states:

> "Under the Proposed Action, establishing DCAs around the most productive NSO sites that will be dynamic as habitat conditions and owl occupancy change will ensure that at least 44 highly productive NSO sites are maintained in the Plan Area, contributing positively to owl demographics locally and within the Province."

The FHCP (Section 5, page 5-6) states:

> "High quality habitat across the landscape provides an opportunity for a stable orincreasing population of NSOs, which is the basis for the success of this FHCP for NSOs. However, protection of the current most highly functional (i.e., high site occupancy and fecundity) nesting sites provides added assurance that this objective will be achieved (Section 5.3.1.4)."

The FHCP also states in the same paragraph:

> "This FHCP affords some protection to all NSO-selected sites in the Plan Area, but identifies and immediately provides the highest level of protection to maintain the 44 most functional NSO sites currently available in the IPA. The protected NSO sites include the core nesting and roosting areas and surrounding foraging habitat. The most functional sites were ranked based on prior occupancy and fecundity, spatial distribution and future potential for high occupancy and fecundity."

Functionality of Initial DCAs

FHCP Table 5-1 (Section 5), which is too large to include herein, shows that many of the initial 44 DCAs are not highly functional NSO sites, in terms of occupancy or fecundity. For example, 14 (32%) of the initial DCAs were occupied ≤3 years during the during the 5-year period (2011–2015) considered during DCA selection (i.e., may not have met the FHCP's definition of high occupancy). Six (14%) of the DCAs were not occupied at all during that period (Section 5, Table 5-1). Mean fecundity in 33 (75%) of the initial set of DCAs during that period (2011–2015) was <0.25 (Table 5-1), meaning that the majority of DCAs do not meet the FHCP's threshold for consideration as highly functional (FHCP Section 5). Twenty-seven (61%) of the initial DCAs had no reproduction (i.e., fecundity = 0) during the period considered during DCA selection. In other words, the majority of initial DCAs do not qualify as highly functional sites, based on the FHCP's criteria.

The FHCP states that some sites were included in the initial set of 44 DCAs, despite recently low occupancy or fecundity, because they were highly functional during 1992–2001 and because it expects them to become highly functional again during the proposed Barred Owl experiment. NSOs are likely to generally respond favorably to Barred Owl removal. However, there is no guarantee that all of the initial DCAs that fail to meet the FHCP's definition of highly functional will be subsequently reoccupied or support high reproduction. And if NSOs do reoccupy apparently abandoned DCAs during the Barred Owl experiment, there is no guarantee they will locate their activity centers in the no-harvest nesting polygons already delineated in those DCAs. It would be prudent to replace some of the initial 44 DCAs with current high functioning NSO sites prior to issuance of the ITP, if they are to effectively mitigate take of NSOs.

Many NSO sites not selected as initial DCAs appear to have substantially higher occupancy or fecundity than some of the initial DCAs (FHCP Appendix G). For example, at least 33 of the non-DCA NSO sites described in FHCP Appendix G were: (a) recently occupied (i.e., at least 1 year during the most recent period reported in that table [2011–2015]), (b) had a mean fecundity ≥0.25 during the most recent period reported [2006–2015]), and (c) had multiple years of occupancy during the period 2006–2015. The information reported in FHCP Appendix G suggests that alternative NSO sites are available for initial DCA selection. CDFW recommends the FHCP ensure that the entire set of initial DCAs consists of recently highly functional NSO sites.
(Recommendation 17).

Spatial Distribution of DCAs

The FHCP (Section 5, page 5-22) states "some other sites with more moderate productivity were selected over more productive sites, because they fulfilled spatial

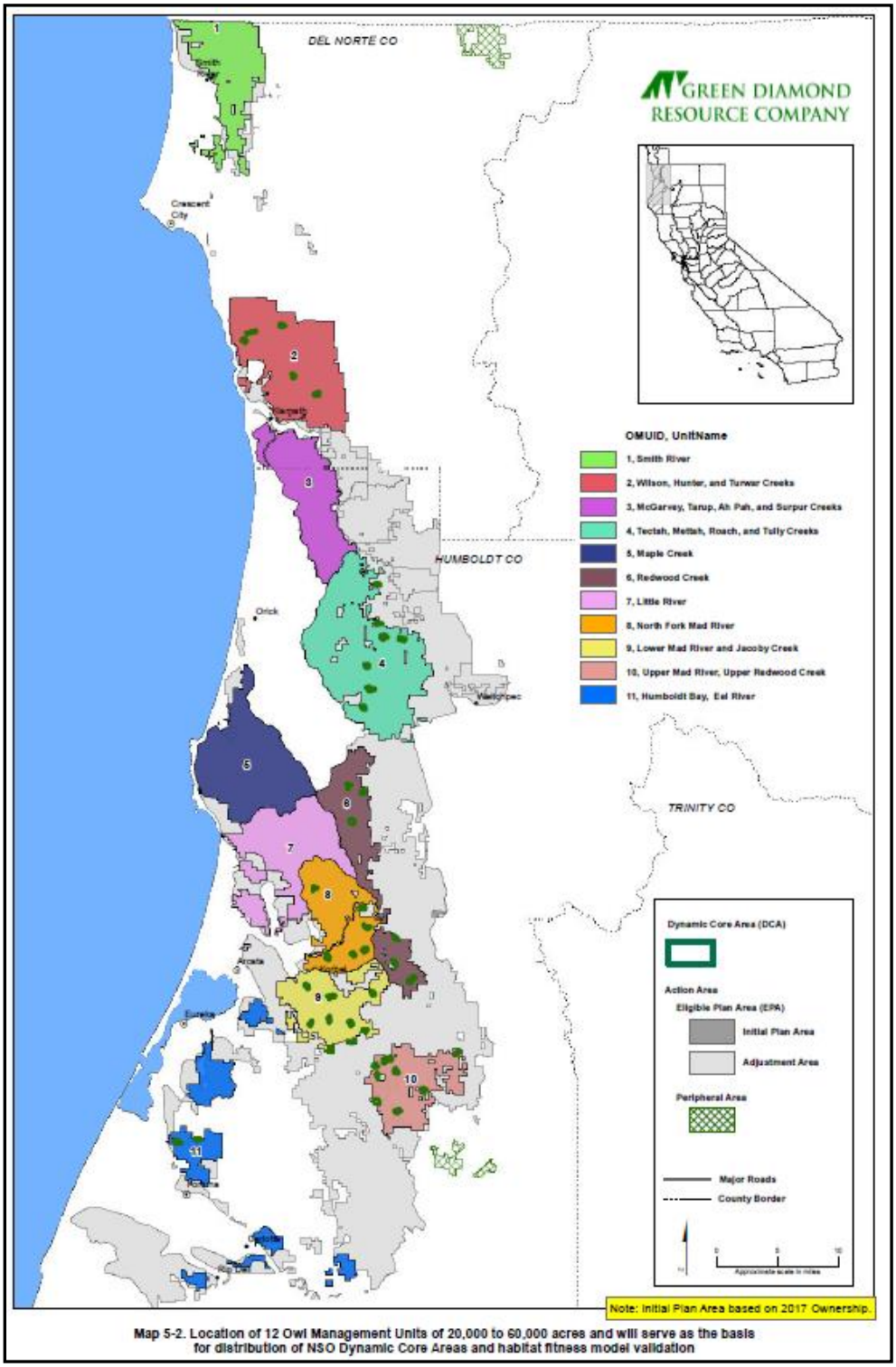
objectives where no other potential DCAs were available." As described above, this statement appears to be incorrect in regard to: (a) the number of initial DCAs with low fecundity (i.e., 75% had fecundity <0.25), (b) the number of DCAs with no recent reproduction (i.e., 61% had a fecundity of 0), (c) the availability of alternative NSO sites for consideration (e.g., the 33 potentially suitable NSO sites described above), and (d) fulfillment of the FHCP's stated spatial objectives for DCAs, as discussed below.

The initial 44 DCAs do not appear to be "distributed throughout the Plan Area" as described in the FHCP (Section 5, multiple subsections, e.g., Section 5.3.1.4). As can be seen in Table 1 and Figure 7 below, many of the 11 Owl Management Units (OMUs) used by the FHCP to select DCAs and monitor the FHCP's NSO conservation strategy (Section 5), have few or no initial DCAs, despite the availability of additional active NSO sites. For example, 4 of the 11 (36%) OMUs have no DCAs. Conversely, the majority (55%) of the DCAs are in just 3 OMUs (see Table 1 and Figure 7). Geographically, northern Del Norte County has no DCAs and the western portion of the Plan Area contains few DCAs (see Figure 7). In terms of the initial DCAs representing the distribution of current active NSO sites, the Smith River OMU has 3 active NSO sites but no DCAs, the Maple Creek OMU has 4 active sites but no DCAs, the Little River OMU has 2 active sites but no DCAs, and the Humboldt Bay, Eel River OMU has 23 active sites but only 2 DCAs (see Table 1). By not distributing DCAs throughout the Plan Area, FHCP Goal One and Objective 1B may not be initially met. CDFW recommends the FHCP be revised so that the initial set of DCAs is better distributed (e.g., in the Plan Area, among OMUs, and in relation to the current distribution of active NSO sites). **(Recommendation 18).**

The FHCP stipulates that new DCAs must replace a DCA in the same OMU, or in the immediately adjacent OMU if the replaced DCA is near an OMU border (FHCP Section 5). Because of this spatial requirement for DCA replacement, it may not be possible for the FHCP to meet Goal One and Objective 1B for many years, if ever, depending on the locations of DCAs being replaced relative to OMU boundaries. CDFW recommends the FHCP be amended to state that replacement DCAs can be selected from adjacent OMUs, regardless of whether the DCA being replaced is near the OMU boundary. **(Recommendation 19).**

Table 1. FHCP Table 1 showing the number of active NSO sites and DCAs among the FHCP's 11 Owl Management Units (OMUs). CDFW added the column showing the proportion of active sites selected as DCAs (#DCAs/#Active).

OMU #	OMU Name	OMU Acres	# Active NSO sites	#DCAs	#DCAs/ #Active
1	Smith River	27,543	3	0	0
2	Wilson, Hunter, Terwer Creeks	44,171	11	5	0.45
3	McGarvey, Ah Pah, Surpur Creeks	30,281	0	0	0
4	Tectah, Mettah, Roach, Tully Creeks	55,668	9	7	0.78
5	Maple Creek	40,004	4	0	0
6	Redwood Creek	27,835	9	8	0.89
7	Little River	34,534	2	0	0
8	North Fork Mad River	26,467	11	6	0.55
9	Lower Mad River, Jacoby Creek	24,915	31	8	0.26
10	Upper Mad River, Upper Redwood Creek	22,848	17	8	0.47
11	Humboldt Bay, Eel River	24,085	23	2	0.09



Map 5-2. Location of 12 Owl Management Units of 20,000 to 60,000 acres and will serve as the basis for distribution of NSO Dynamic Core Areas and habitat fitness model validation

Figure 7. FHCP Map 5-2 showing the locations of Owl Management Units (OMUs) and DCAs. Note the limited number, or lack, of DCAs in many of the OMUs.

The FHCP (Section 5, page 5-23) describes OMUs under the heading "rationale for the DCA strategy", indicating the importance of this reserve design concept to the FHCP's conservation strategy and mitigation for NSOs. As described in FHCP Section 5.3, the OMUs were loosely based on previous NSO reserve design concepts, including the importance of distributing reserved habitat areas at distances that enable juvenile NSOs to disperse between them (Thomas et al. 1990, USFWS 2008). While this is reasonable in concept, it is unclear whether or how OMUs or DCAs function as habitat reserves. A DCA core polygon provides a relatively small (typically <89 acres) patch of protected habitat for use by owls in a single territory. It is not a habitat reserve within which dispersing juveniles can settle, particularly if it is already occupied by adult NSOs, as most DCAs should be. Neither can OMUs be considered habitat reserves. OMUs appear to be intended to function as reserves based on modeled projections of increasing amounts of high quality habitat in the Plan Area. As discussed in CDFW's comments on the HFP modeling, these modeled projections may be incorrect, as they are based on potentially inappropriate projections of territory-specific modeling to much larger landscapes (Franklin et al. 2000, Franklin 2007: see Attachment 3). The only habitat reserves for NSOs on GDRCo land are set-asides, which will become available for harvest upon issuance of the ITP (see CDFW Comment Section 1).

Even if OMUs will, in fact, contain increasingly large amounts of high-quality habitat for NSOs, they may not function well as reserves. Citing research relevant to the NSO reserve design concepts on which OMUs were based, FHCP Section 5.3 states that reserves for NSOs should contain at least 5–20 NSO pairs in order to support viable populations, and that larger numbers of pairs support greater population viability. In contrast, none of the 11 OMUs has more than 8 DCAs, 5 (46%) of them have 0–2 DCAs, and 4 (36%) have no DCAs. In other words, most or all of the OMUs appear to contain insufficient numbers of DCAs to maintain viable populations of NSOs. The larger population of NSOs in non-DCA territories are likely to augment the population viability within most OMUs. However, the FHCP does not stipulate which non-DCAs will be protected from take or from reinvasion by Barred Owls during Phase 3 of the Barred Owl experiment, which will be implemented during most of the Plan's term (see CDFW Comment Section 6, below).

OMUs, and the habitat reserve design concepts on which they are based, are intended to ensure that protected areas for NSOs (e.g., DCAs) are not disproportionately impacted by random environmental events, such as large, severe wildfires. On public lands in the southern portion of the NSO's range, wildfires are the primary source of habitat loss for NSOs (USFWS 2011a). However, little or no recent vegetation change on GDRCo land can be attributed to wildfires (Kennedy et al. 2010). Additionally, the risk of wildfire in the near future appears to be quite low in the relatively cool, humid forests in the Plan Area (Davis et al. 2011). Given the small number of DCAs and the

low risk of large, severe wildfires, OMUs appear to be relatively unimportant for conserving NSOs. The FHCP's spatial criteria for selecting DCAs could therefore, be relaxed in order to select more highly functional DCAs and provide more effective mitigation for take.

Habitat Protection in DCAs

The FHCP will delineate polygons of core habitat for NSOs in DCAs, in which no timber harvest may occur unless the DCA is replaced. The "acres" column in FHCP Table 5-1 indicates the sizes of the initial DCA core habitat polygons. Those polygons range in size from 56 to 130 acres, with a mean of 86 acres. The DEIS (page 2-11) states that the initial DCAs "have a minimum no harvest-core area of 89 acres"..."except in rare cases where the site lacked suitable nesting habitat to create a core area of this size". However, 27 (61%) of the initial DCAs have core habitat polygons less than 89 acres. This means the majority of DCAs (rather than rare cases) have lower amounts of habitat protected in no-harvest polygons than is protected through the take threshold for all NSO sites. CDFW recommends the FHCP's initial set of DCAs be revised such that all initial DCAs have a core habitat polygon that is as large, or larger, than the 89-acre take avoidance threshold. **(Recommendation 20).**

CDFW was able to view the initial DCAs in a GIS environment. On that occasion, CDFW observed that the core habitat polygons were generally well drawn in terms of the shapes of the habitat patches within which the territory's historical nests were clustered. However, many of the DCAs have polygons that are not entirely filled with forest ≥46 years. In some cases, there was no mapped additional forest in that age class, while in others, the polygon appeared to bypass forest in that age class; perhaps in order to capture or avoid topographic features such as large creeks. Several DCAs have polygons comprised of 0–50% forest ≥46 years. The observation that many of the DCAs' no-harvest polygons are less than 89 acres, and that many of those are not filled with forest ≥46 years, further suggests that the initial set of 44 DCAs should be reevaluated. As described above, FHCP Appendix G suggests that perhaps dozens of alternative and potentially more suitable NSO sites are available for consideration as DCAs. CDFW recommends the FHCP's initial set of DCAs be revised such that all initial DCAs have a core habitat patch that is at least as large as the 89-acre take avoidance threshold. **(Recommendation 21).**

While viewing the initial DCAs in GIS, CDFW noted that 0.5-mile buffers around recent (2015) activity centers for a territory were often distant from, and in some cases did not overlap at all, with the DCA polygons for that territory. This appeared to occur because the 0.5-mile buffer was placed around a recent activity center, whereas DCA polygons were drawn around clusters of historical nests that may not have been recently used. This suggests there is no requirement to retain 233 acres of foraging habitat within 0.5 mile of the DCAs. If the DCA is unoccupied, or if the current activity center is distant

from the DCA, could harvesting reduce the amount of foraging within 0.5 mile to below 233 acres? Are activity centers associated with DCAs, but not occurring within the DCA, available for take? If such a scenario is possible under the FHCP as written, DCAs could fail to function as mitigation for take. CDFW also observed that many of the DCAs were located near the edges of GDRCo property. It was unclear if some of those DCA territories might include areas managed by other landowners and potentially be negatively affected by activities outside GDRCo's control. If the FHCP, as written, precludes the possibility of these potential impacts, it should be revised to clarify these points. CDFW recommends the FHCP be amended to clearly describe the take avoidance and DCA protection measures for: (a) when DCAs are relatively distant from the current AC associated with the DCA and (b) when DCAs are located within 0.5 mile of GDRCo's property boundary. The FEIS should also evaluate whether DCAs located nearby property boundaries are protected from activities that occur off-property. **(Recommendations 22–24).**

6) Barred Owl Experiment

The FHCP's Barred Owl Research (FHCP Goal 4) consists of three experiments ("phases") aimed at ensuring "a well distributed population of NSOs throughout the Plan Area" (Section 5.2.2, page 5-5). Phase 1, a pilot study, has already been completed and its results have been published (Diller et al. 2014, 2016). As described in FHCP Section 5.3.4.1, the results of Phase 1 suggested that lethal removal of Barred Owls had positive effects on the occupancy and demography of NSOs within the pilot study area. The FHCP will implement Phase 2 of the experiment after approval of the FHCP. The objectives of Phase 2 are similar to Phase 1 but the area in which Barred Owls are removed would approximately double in size (most of the Plan Area). Phase 2 would be completed when GDRCo detects a statistically significant difference in NSO demographic trends between the study area and the Willow Creek Study Area. Following completion of Phase 2, the FHCP will implement Phase 3 of the experiment. Phase 3 consists of two parts: GDRCo will first allow Barred Owls to recolonize some areas from which they were previously removed, after which, GDRCo will attempt to suppress Barred Owls in a way that meets the FHCP's NSO objectives while minimizing lethal removal.

The FHCP does not directly describe the Barred Owl experiment as mitigation for take of NSOs. The Barred Owl is protected under the Migratory Bird Treaty Act and Fish and Game Code, and removal of Barred Owls by the FHCP can only be done in the context of scientific research, rather than solely as mitigation for take. However, the DEIS appears to recognize the Barred Owl experiment as both a primary mitigation for take of NSOs and a primary reason for selecting the FHCP as the "preferred alternative" to other actions. For example, the DEIS (Table ES-1, page vi) states in the summaries for

No Action and Alternatives A and B, "No barred owl removal would occur. Adverse effects to spotted owls from barred owl interactions would continue to occur."

Phase 1

GDRCo conducted Phase 1 of the Barred Owl experiment during 2009–2014 (Diller et al. 2016). After treatment, NSOs exhibited higher occupancy, productivity, survival, and population growth rate in treatment (removal) areas than in control (no removal) areas. These findings are encouraging in regard to the benefits of intensive Barred Owl removal programs for slowing negative population trends of NSOs.

Phase 2

The results of Phase 1 of the Barred Owl experiment suggest that Phase 2 will also benefit NSOs in the Plan Area. However, it is not guaranteed that similar positive trends will be produced by Phase 2 as by Phase 1. During Phase 2, GDRCo will remove Barred Owls from nearly the entire Plan Area. The Plan Area is relatively long and narrow area and therefore has a large amount of shared property boundaries with neighboring ownerships, relative to the size of the area within which Barred Owls will be removed. The FHCP (Section 5.3.4.2, page 5-48) notes:

> “Of particular interest will be barred owl immigration rates given that the Plan Area will potentially be surrounded by lands supporting high densities of barred owls. The level of immigration will potentially delay, or even suppress, a positive NSO demographic response in the future, which will provide valuable information concerning the recovery of NSOs in other portions of its range.”

The FHCP (Section 5.3.4.2, page 5-48) further notes:

> “This experiment is important because it will allow Green Diamond to assess the feasibility of doing barred owl removal on a much larger scale and after barred owls have been established for decades and potentially occurring at higher densities.”

Removal experiments are currently being conducted in other study areas with high densities of Barred Owls that have been established for relatively long periods of time (Wiens et al. 2017, Hoopa reservation). It is still too early to tell what the results will be of those experiments, but it is unclear if they will have as positive effect as GDRCo's pilot study apparently had.

The FHCP will implement Phase 2 until both the FHP model is validated and "a statistically significant trend is detected in the parameters of interest (e.g., survival, fecundity, lambda) between Green Diamond and the Willow Creek Study Area (FHCP

Section 5.3.4.2, page 5-48)." This objective is unclear and could be problematic to achieve. For example, there does not appear to be a contingency plan in the FHCP for the possible cessation of the Willow Creek Study, which may not continue throughout Phase 2 of the experiment. CDFW is also concerned that validation of the HFP model projections of future habitat trends may not be technically possible. First, those habitat projections appear to be inappropriate, as they appear to project territory-scale modeling to an area approximately 750 times larger than an NSO territory. At that large landscape scale, NSO population, behavioral, and ecological factors not included in the HFP modeling would need to be accounted for (see CDFW Comment Section 1; see Attachment 3). Second, occupancy could provide an unreliable metric for habitat quality; for example, if occupancy estimates are inflated by high turnover due to poor habitat quality or influence of Barred Owls prior to their complete removal from the Plan Area (e.g., Higley and Mendia 2013, Lesmeister et al. 2016, Berigan et al. 2018). Phase 2 of the Barred Owl experiment is likely to have some positive effects on the Plan Area's NSO population. However, CDFW recommends the FEIS evaluate the Barred Owl experiment's objectives in light of the potential cessation of the Willow Creek Study prior to completion of Phase 2. CDFW also recommends the FEIS evaluate Barred Owl experiment objectives and timelines in regard to possibly inappropriate use and validation of the HFP modeling. **(Recommendations 25 and 26).**

Phase 3

The FHCP (Section 5.3.4.2) predicts that Phase 2 of the Barred Owl experiment will be implemented for approximately 5–10 years. If that prediction is correct, Phase 3 of the experiment will be implemented for the remaining 40–45 years of the Plan's term. During Phase 3, GDRCo will continue to remove Barred Owls in portions of the Plan Area and will allow Barred Owls to recolonize other portions. The FHCP (Section 5.3.4.2., page 5-49) does not describe which portions of the study area will be assigned as treatments and controls, except that "it is likely that control areas will include the DCA sites and potential DCA sites." Though there will likely continue to be some positive effects from Barred Owl removal in selected portions of the Plan Area, the degree to which it will function as mitigation for take is unclear. The DEIS appears to have considered the Barred Owl experiment as the primary mitigation for take of NSOs, but the degree to which partial Barred Owl removal for 80–90% of the Plan's term will mitigate for the FHCP's estimated cumulative take of 250 NSO sites is unclear. CDFW recommends the FEIS more clearly evaluate the value of Phase 3 of the Barred Owl experiment as mitigation for take. CDFW also recommends both the FEIS and FHCP include more detailed descriptions of Phase 3. CDFW assumes that GDRCo will describe the locations of treatment and control areas during Phase 3 when applying for scientific collection permits for that Phase. However, CDFW recommends that the FHCP be amended to state that it will convene a scientific panel to provide input on the best locations for treatment and control areas both for maximizing the scientific value of the experiment and minimizing the negative impacts of recolonization by Barred Owls

on the Plan Area's NSO population. For example, if reinvasion is allowed in areas with high concentrations of NSO sites or habitat, it could suppress occupancy by NSOs and allow harvesting of "vacant" sites without triggering take reporting and assessment. **(Recommendations 27–29).**

7) Accounting and Estimation of Take

Like the 1992 HCP, the FHCP will primarily evaluate take of NSOs in regard to "displacement" of owls from sites that have been harvested. A site may be "directly displaced" through harvesting near the site center (≤500 feet), or "indirectly displaced" through harvesting below the HCP-defined habitat thresholds (<89 acres forest ≥46 years and <233 acres forest ≥31 years). GDRCo may remove a displacement (i.e., take is not deemed to have occurred) if the displaced site meets a complex set of occupancy and nesting criteria in the years following harvesting (see FHCP Appendix C, Chapter 1 for a summary of removal of displacements). GDRCo evaluates take in regard to the status of the site, rather than the fates of the owls that originally occupied the site. Therefore, the HCP's current definition of take (i.e., displacement) does not account for potential effects of harvesting on site turnover, or on the survival, reproduction, or fitness of the original occupants of harvested sites.

Effects of Take on Habitat Fitness Potential and Demography

The FHCP (Appendix C) includes GDRCo analyses of potential impacts of HCP-defined take on NSO occupancy (including site abandonment), fecundity, survival, and rate of population change (lambda). Occupancy could be a relatively unreliable indicator of population impacts of take because areas with high occupancy, abundance, or density can be population "sinks", that do not contribute to the larger population's persistence (Van Horne 1983, Pulliam 1988, Schumaker et al. 2014). Additionally, estimates of occupancy for NSOs can be inflated in areas impacted by Barred Owls or habitat disturbance, which can cause territorial NSOs to range more widely than expected, and be detected at more than one site within a single season (Higley and Mendia 2013, Lesmeister et al. 2016, Berigan et al. 2018). Of the information provided in FHCP Appendix C, GDRCo's analyses of take's effects on Habitat Fitness Potential (HFP) and population demography are perhaps most relevant for evaluating potential impacts of take on the NSO population in the Plan Area.

GDRCo (FHCP Appendix C, Chapter 4) evaluated potential effects of take on HFP. Take was not included in the best performing model for survival. However, survival was positively associated with being located within 0.5 mile of a set-aside, which are no-take habitat reserves. In regard to this finding, GDRCo (FHCP Appendix C, page C-161) stated, "owls in or near set-asides might be expected to have higher survival relative to non-set-aside (i.e., matrix) birds, because more owl sites in the matrix were taken on a

regular basis as provided for by the incidental take provision of the HCP." GDRCo's HFP modeling found more direct evidence of a negative impact of take on fecundity. In regard to this result, GDRCo (Appendix C, page C-167) stated, "the negative impact of take on fecundity was also expected since individuals subjected to take were typically displaced and forced to find a new territory before they could attempt nesting." GDRCo found that take, which had a negative effect on NSOs, was the second most influential variable on habitat fitness potential. The most influential variable was a positive effect of being located in or nearby a set-aside (no-take habitat reserve).

The FHCP (Appendix C, Chapter 4) also includes an analysis of potential influences of take on the demography of NSOs on GDRCo's ownership. The analysis indicated that take did not have a significant effect on survival. However, take appeared to reduce fecundity by approximately 64%, 49%, and 15% for first-year subadults, second-year subadults, and adults, respectively. The analysis indicated that take reduced lambda at that time from 0.951 to 0.938 (lambda <1 indicates a declining population). This may appear to be a small change in lambda (-1.4%). However, over a period of decades (e.g., the FHCP's 50-year term), it could sum to a large decrease in the total population size (e.g., see Figure 5 in Dugger et al. 2016 for graphs of cumulative population declines in demographic study areas).

In contrast with the post-hoc analysis finding in FHCP Appendix C, more recent, published demographic modeling indicated that harvesting of nesting/roosting habitat negatively affects the survival of NSOs on GDRCo's ownership (Dugger et al. 2016). This finding suggests that take resulting from harvesting of nesting/roosting habitat could negatively affect the survival of NSOs in the Plan Area.

Dugger et al. (2016) found that disturbance of nesting/roosting habitat on GDRCo land appeared to negatively impact survival but positively affect occupancy. These findings suggest that occupancy may poorly reflect the demographic effects of harvesting and take on NSOs in the Plan Area. As noted above, estimates of occupancy may be inflated in landscapes with habitat disturbance or Barred Owl presence, which cause some territorial owls to move around the landscape and potentially be detected in more than one territory within a single season (Higley and Mendia 2013, Lesmeister et al. 2016, Berigan et al. 2018). Combined, this body of research suggests that the 1992 HCP and FHCP method for determining take, which relies to a large degree on subsequent occupancy at a displacement site, could lead to underestimates of take. For example, FHCP Appendix C (Chapter 1) stated that timber harvesting triggered reporting of 75 displacements during 1992–2008 but that 30 of those were "returned" due to subsequent occupancy and/or nesting by NSOs. CDFW recommends the FEIS evaluate whether the methods for determining take of NSOs meet the goals of the FHCP. This evaluation should include review of research conducted since 1992, which suggests that occupancy may inaccurately reflect impacts of timber harvesting on NSOs in the Plan Area. An accurate assessment of take is necessary for determining whether

the FHCP's conservation strategy, take avoidance, and mitigation measures are adequate for maintaining the population. **(Recommendation 30).**

Estimation of Take in Light of Research Conducted Subsequent to the 1992 HCP's Approval

As reviewed earlier in this letter (see CDFW Comment Section 1), a tremendous body of research conducted since 1992, including on GDRCo's ownership, has consistently indicated that avoiding take of NSOs would require retention of approximately 50% of the territory (ca. 250 acres within 0.5 mile) in nesting/roosting habitat. In contrast, the 1992 HCP and FHCP use 18% (89 acres) of the territory in nesting/roosting habitat as a threshold for triggering reporting and analysis of indirect displacement. The FHCP's use of the 89-acre threshold was based on the habitat conditions in the lowest portion (mean -1 SD) of a sample of NSO territories in a single master's thesis, and was not related to any metric of habitat quality. CDFW recommends the FEIS evaluate whether the FHCP's habitat thresholds for reporting and analyzing indirect take are supported by the best available science and, if not, how that could affect the FHCP's estimates of take. **(Recommendation 31).**

The habitat definitions/categories used for the FHCP's take thresholds were also retained from the 1992 HCP. As reviewed in CDFW's comments earlier in this letter (see CDFW Comment Section 3), those habitat definitions are solely based on stand age and do not appear to adequately reflect the habitat relationships of NSOs, as demonstrated by research conducted since 1992. For example, GDRCo research has indicated that NSOs on the company's ownership strongly prefer to nest both in structurally complex, older stands and in stands with large numbers of residual older trees (reviewed in CDFW Comment Sections 3 and 4). CDFW recommends the FEIS evaluate the habitat amounts and definitions used in the FHCP as thresholds for triggering reporting and analysis of take and, if they are found to be inadequate in light of the best available science, how that could affect the FHCP's estimates of take. **(Recommendation 32).**

The FHCP's authorized rate of take (3 per 100 NSO sites) is based on GDRCo's estimated rate of take under the 1992 HCP (FHCP Section 6). The FHCP (Section 6.2.2.3) anticipates that the actual rate of take will be lower than under the 1992 HCP because it predicts that NSOs will move from areas desirable for harvesting (e.g., upland areas with residual older trees) to RMZs and geologically unstable areas. Yet, it is also possible that the rate of take could be higher under the FHCP than under the 1992 HCP. For example, GDRCo's HFP and demographic modeling suggest that harvesting the 1992 HCP set-asides under the FHCP will negatively impact the population (summarized above and in CDFW Comment Section 1). The FHCP's conservation strategy for NSOs is largely based on retention in narrow ("dendritic") RMZs and often-small geologically unstable areas (FHCP Section 5; e.g., see Figure 2

in CDFW Comment Section 1). Published research in northwestern California and southwestern Oregon (where NSOs likewise primarily subsist on woodrats) has shown that high survival and fitness of NSOs is associated with larger or clustered patches of nesting/roosting habitat, rather than narrow or scattered small patches as promoted in the FHCP (Franklin et al. 2000, Olson et al. 2004, Dugger et al. 2005, Schilling et al. 2013). Additionally, it should be considered that RMZs can be partially harvested, which could target larger, older, more commercially valuable tree favored by NSOs (see CDFW Comment Section 4). CDFW recommends the FEIS evaluate whether the actual rate of take under the FHCP could be different than under the 1992 HCP owing to differences in the two HCPs' conservation strategies for NSOs. This analysis is important for determining whether the authorized rate of take accurately reflects what will occur under the FHCP and whether the NSO population in the Plan Area will be sustainable. **(Recommendation 33).**

8) Disturbance

Covered Activities described in FHCP Section 2.2 include project-induced noise and visual disturbances that may negatively affect nesting NSOs. These activities include timber harvest: falling, bucking, and yarding timber (including helicopter yarding) as well landing construction and maintenance. There are also variety of other Covered Activities with the potential to impact nesting NSO. These activities include:

- Salvaging Timber Products (FHCP Section 2.2.3) (including dead or dying trees removed along the roads).
- Road Construction, Maintenance and Use (FHCP Section 2.2.5), which includes watercourse crossing installation (including culverts and bridges), excavating or filling hillslope areas using tractors or excavators, grading, and mechanical control of roadside vegetation.
- Rock Pit Development (FHCP Section 2.2.6) where rock is excavated, crushed, blasted for eventual road use.

The USFWS document titled "Guidance for Estimating the Effects of Auditory and Visual Disturbance to Northern Spotted Owls and Marbled Murrelets in Northwestern California" (July 31, 2006) identifies project-induced noise disturbances that may result in "NSO behavioral responses such as flushing an adult or juvenile from an active nest during the reproductive cycle resulting, and/or precluding adult feeding of young." These behaviors could result in the abandonment of the nest such that dependent young would not survive, or effects to eggs through predation or failure to incubate (Fyfe and Olendorff 1976).

The 2006 USFWS guidance categorizes noise disturbance. It identifies heavy equipment use (e.g. excavators and tractors) (without the use of back up alarms) as a

“High” sound level generating 81–90 decibels. Back up alarms, felling of large trees, yarding whistles, vibratory compactors, jake brakes, rock excavation are activities categorized as “Very High” generating 91–100 decibels. Rock blasting and pile driving are considered “Extreme” in the 101–110 decibel range, and logging helicopters are listed as “Exceeding 110 decibels.”

Under the guidance document, to protect against abandonment of nests and death of eggs or young during the breeding season, the above activities would receive anywhere from a 500-foot disturbance buffer to over a 0.25-mile buffer in a forested setting during the breeding season.

The FHCP requires NSO surveys prior to any Covered Activities that could result in harm or take of nesting NSO. Appendix F, F.1.1.1 (Identifying the Project Area, Survey Area and Habitat to Survey) provides direction for when and where surveys should occur:

> “The project area includes the polygon or multiple polygons that form the timber harvest unit boundaries and associated road construction rights-of-way that require timber falling or any other area in which any of the Covered Activities could result in harm or take of a NSO. This area includes all lands delineated for the proposed project that may be subject to activities potentially impacting NSOs through habitat modification, direct injury, noise disturbance, or any other means."

After surveys locate an NSO site, FHCP Section 6.2.4.7 (Considerations for Noise Disturbance) provides direction for how to mitigate and minimize the disturbance of Covered Activities. FHCP Section 6.2.4.7 (Considerations for Noise Disturbance) states:

> “Nesting NSOs at sites near THP units scheduled for timber harvest that could result in take (i.e., habitat thresholds may be exceeded) are protected from noise disturbance from timber operations due to a 0.25-mile buffer around the nest site, or following fledging, a 500-foot buffer around the roosting area of the owlets.”

This FHCP language states that only “Nesting NSO sites near THP units scheduled for timber harvest that could result in take (i.e., habitat thresholds may be exceeded) are protected from noise disturbance.” However, the majority of NSO sites will not fall into this category; since, the FHCP allows take of 3 NSOs per 100 sites in a given year. It appears from this section that NSOs nesting near THP units, but not designated for “take,” would not receive disturbance protection. Additionally, a host of “other Covered Activities” such as salvage logging, crossing installation, excavation, grading, rock

crushing, and blasting would not be minimized or mitigated even if NSOs were nesting directly adjacent to the activity. **(Recommendations 34 and 35).**

9) Take and Mitigation in the Adjustment Area

Increased Take

The FHCP allows for the addition of lands covered by the FHCP without amendment (i.e., without additional public review). Up to 15% of the acres in the Initial Plan Area (IPA) (approximately 357,415 acres [FHCP Map 1-2]) may be added from the Adjustment Area (339,667 acres) without amendment (Section 1.4.7). The Adjustment Area and the IPA together make up the Eligible Plan Area (EPA) (697,082 acres). Therefore, approximately 53,600 (IPA acres x 15%) additional acres may be added and managed under FHCP coverage over the life of the permit without an amendment.

FHCP Section 1 describes commercial timberlands in the Adjustment Area as being similar to those in the IPA. Section 1.4.7.1 states: "The commercial timberlands in the EPA also have common characteristics directly related to habitat conditions for Covered Species." Section 4 of the FHCP describes these characteristics in detail, including:

- Forest ecosystems with conifer stands dominated by coastal redwood and Douglas-fir.
- A pattern of forest stand structure produced by Green Diamond management and California FPRs that consists of a mosaic of small patches of harvest and various ages of reproduction with intermittent closed-canopy mature stands where land owners elect to manage under a selective harvest regime.
- A dendritic pattern of larger and older forest stands following riparian corridors and unstable geologic areas resulting from management under the AHCP/CCAA and, to a lesser degree, FPRs.

The description in FHCP Section 4 (4.2) provides a discussion of geology, climate, and forest type by ecoregion and hydrographic planning area within the EPA. CDFW could not find information on the characteristics of the management patterns or trends, riparian corridors, etc. within the Adjustment Area as the FHCP describes (bullets two and three above).

FHCP Section 4.3 (Covered Species: Habitat, Status, and Projected Trends with the Plan Area) provides analysis of Habitat Fitness, Trends in Habitat Fitness, Demographic Trends, and the lower Mad River Case Study within the IPA. An analysis of the Habitat, NSO Status, and Projected Trends in the Adjustment Area is not included. With a potential to increase the plan area by 53,600 acres from a potential area covering over 339,000 acres, it would be appropriate to analyze the potential effects of the FHCP to

NSOs in the Adjustment Area. GDRCo's current estimation of total NSO take in the plan area is based solely on data pertaining to IPA lands. There is no estimated range of potential take increase with the addition of Adjustment Area lands. **(Recommendation 36).**
The FHCP and FEIS could provide estimates of annual and cumulative take for the Adjustment Area. For example, if: (a) 15% of the IPA's acreage is added to the Plan Area from within the southern portion of the Adjustment Area, (b) the density of occupied sites in that area is similar to GDRCo's southern density study area (77 sites/165,650 acres; see FHCP Map 4-2 showing likely similar densities), and (c) the rate of take in the Adjustment Area is the same as the authorized rate of take in the IPA (3 takes/100 sites/year), then a cumulative take of 38 NSO sites or 76 adult NSOs could occur in the Adjustment Area, in addition to the 250 sites and 500 NSOs estimated for the IPA. Similar calculations could be provided for different portions or sizes of Adjustment Area.

If additional acres are added from the Adjustment Area, then the corresponding mitigation measures should also increase. For example, Conservation Goal 1b, Maintain Highly Functional NSO Nesting Sites throughout the Plan Area, establishes the retention of 44 of the most functional NSO sites in the plan area (Dynamic Core Areas). Given an increase in the plan area and potential increase in number of NSOs taken, it would be appropriate for the number of Dynamic Core Areas to increase proportionally. **(Recommendation 37).**

Reporting Requirements

When GDRCo proposes to add lands to the plan area, the FHCP Section 1.4.7.2.3 directs:

> If Green Diamond elects to add commercial timberlands to the Plan Area pursuant to this paragraph, **Green Diamond shall submit to the Service a description of the lands it intends to add**, along with a summary of relevant characteristics they share with existing Plan Area lands. Such characteristics may include geology and geomorphology, climate, vegetation, habitat conditions (**including water temperature, channel and habitat type, large woody debris inventory, and estuarine conditions**), and Covered Species occurrence and status.

The requirement to provide water temperature, channel and habitat type, etc. (bolded above by CDFW for emphasis) appears to be an oversight and may have been retained from the Aquatic HCP, which was written for protection of aquatic animals. CDFW recommends this requirement include additional information relevant the FHCP terrestrial covered species including an analysis of the NSO activity sites and habitat on

the proposed additional lands, and an assessment of whether this would constitute a new management area benefiting from additional DCAs. **(Recommendation 38).**

10) Direct Harm

FHCP Section 6.2.2.2.1 (Direct Harm) states:

> "Unintended direct harm to NSO may occur when they are not detected during pre-harvest surveys and their nest stand is cut during the breeding season without knowledge of their presence. Adult NSO likely abandon these stands and avoid direct physical harm, but this activity may kill eggs, nestlings or fledglings with limited ability to fly."

The FHCP (Section 6.2.2.2.1) estimates that 2.5 NSO sites, or 10 individual NSOs (assumes 2 adults and 2 young at each affected site) will be directly harmed during the Plan's term. The FHCP ((Section 6.2.2.2.1, pages 6-7–6-8) estimated the number of sites at which NSOs could be directly harmed by multiplying "the rate of documented occurrences of undetected nesting attempts (0.156%) by the number of future NSO sites that are projected to have annual harvest within 0.5 mile."

Green Diamond's NSO survey effort is designed to achieve a minimum 95% detection probability (Appendix F). This would indicate there is up to a 5% chance of not detecting NSOs when they are present. However, as described above, the FHCP determination of the number of NSOs that will be directly harmed is based on the number of times (n = 5) the company found NSOs nesting when previous surveys had concluded no nesting birds were present. The FHCP's estimate of the probability of not finding nesting birds is based on known occurrences, rather than the probability of missing nesting, which could include birds never seen by timber operators/surveyors. It is reasonable to assume (and based on the 95% probability of detection) during this period there were additional cases when NSOs nested but were not found by surveyors. Using the same detection probability GDRCo utilizes for their FHCP surveys (accounting for the effect of Barred Owls) would appear to be a more appropriate method for calculating the number of nesting sites with the potential for direct harm. **(Recommendation 39).**

11) Sustainable Population of NSOs on the Covered Lands

GDRCo estimates the cumulative indirect take ("incidentally tak(ing) NSO through habitat modification that harms NSO by interfering with essential behavior" [FHCP Section 6.2.1]) during the FHCP's term to be approximately 250 NSO sites or 500 individuals (FHCP Section 6.2.3). The FHCP states, as of 2015, there are 166 active sites known to occur within the plan area and a 0.5-mile buffer (GDRCo may affect sites

within 0.5 mile of the property) (FHCP Section 6.2.3.1). The only requirement in the FHCP to maintain NSO nesting habitat around active NSO sites within the Plan Area (in a configuration that would not "interfere with essential behavior") occurs within the 44 NSO Dynamic Core Areas (FHCP Objective 1A). The FHCP's rate of authorized take (Section 6) hypothetically allows take to continue until only 47 NSO sites remain. Adaptive Management (Section 5.3.6) could be triggered before the number of NSO sites is reduced to this level. However, there does not appear to be any assurance of this as the FHCP does not set a minimum population size or total number of occupied sites.

Additionally, even after adaptive management is triggered, there does not appear to be any time limit within which substantive adaptive management actions must be taken. For example, if the expert panel is unable to come to a conclusive determination on the cause of the trigger, and the appropriate action for addressing it, research continues for an additional 5 years, without any apparent time limit for a final determination and action. CDFW recommends the FEIS describe both the minimum sustainable population size and number of occupied/active NSO sites in the Plan Area. CDFW also recommends the FEIS evaluate the maximum number of years over which the adaptive management process could extend, and whether the minimum population size and number of occupied/active sites will be maintained during that period. **(Recommendation 40).**

12) Adaptive Management

Scientific Panel

FHCP Section 5.3.6 addresses a range of Adaptive Management responses GDRCo will apply when monitoring triggers are reached or exceeded. When a Red Light Threshold Trigger is reached (FHCP Section 5.3.6.1) one response is to set up a 3-member scientific review panel, which the Service and GDRCo must agree on. There appears to be no contingency if the Service and GDRCo cannot come to agreement on the panel members. CDFW recommends the FHCP be amended to include a statement such that if the Service and GDRCo cannot come to agreement on the members of the scientific review panel, then the Service will choose one member and GDRCo may choose one and agree on a third. This will ensure the scientific approach to resolving future issues, as intended by the FHCP, will be applied. **(Recommendation 41).**

Fecundity Comparisons

Under Adaptive Management Commitment Two (Objective 5C), a Red Light Trigger occurs if "the trend in mean fecundity estimate from the Plan Area is statistically lower ($p \leq 0.05$) than a **comparable regional mean."** CDFW recommends the FHCP identify

an absolute mean fecundity based on what is intended for the plan area. Other landscapes or ownerships may not continue surveys or may not have the same objectives as this FHCP and, as such, may not be appropriate as a measure of comparison. **(Recommendation 42).**

Adaptive Management Reserve Account

FHCP 5.3.6.2 establishes an Adaptive Management Reserve Account (AMRA) to fund (in acres) management adjustments that may be made during the life of the FHCP. The AMRA will be credited with 1,068 acres at the beginning of the FHCP for use in the expansion or creation of additional DCAs as well any modification of the current NSO measures described in Section 5.3. This appears to constrain the addition of NSO habitat in future adaptive management analyses to no more than 1,068 acres. There is no supporting analysis in the FHCP to confirm that no more than 1,068 acres will be required in the future to sustain the intended NSO population and support all FHCP objectives over the 50-year period.

As described above in CDFW's comments on the FHCP's habitat thresholds for analyzing take and selecting DCAs (CDFW Comment Section 2), if the current FHCP NSO habitat retention thresholds (89 acres of nesting habitat) were found to be insufficient, limiting the possible expansion of DCAs by only 1,068 acres total would appear to significantly impair the ability of adaptive management process. **(Recommendation 43).**

13) Reporting, Monitoring, and Compliance

The Service must monitor GDRCo's implementation of the FHCP and the permit terms and conditions pursuant to the ESA. Section 2.1.2.13 of the DEIS (Implementation, Reporting, and Review Commitments) summarizes GDRCo's Implementation Commitments (FHCP Chapter 5.3.7). The DEIS states that these are measures and processes that GDRCo "will implement to ensure that implementation of the FHCP is integrated with implementation of THPs and report compliance with requirements of the FHCP."

CDFW is concerned that if specific and enforceable language is not included in the implementation commitments, it will be difficult to monitor for FHCP effectiveness and compliance. Receiving detailed information in THPs and the annual report allows for a timely review, decreasing the risk of not observing and addressing violations to the terms of the incidental take permit until it is, perhaps, too late (i.e., the timber is harvested). Implementation Commitment Four (FHCP Chapter 5, page 72) requires that annual meetings with the Service will occur to review the conservation measure implementation for the first five years of the FHCP. There appears to be no avenue for

the Service to request additional information or meetings it may find necessary to review for compliance at a later date.

After FHCP approval, and given that the document will be a 50-year permit, if the Service finds additional information is required in the annual reports to aid in review for compliance with the FHCP, what avenue does the Service have to request this? It appears that there are no mechanisms for requesting additional annual meetings and information/disclosure in the annual reports or compliance reporting. CDFW recommends revising the FHCP Implementation Commitments to include, "The Service may require annual meetings or the submittal of additional information as necessary to determine compliance with the FHCP at any time." **(Recommendation 44).**

Reporting Requirements in Timber Harvesting Plans

Cal. Code Regs., tit. 14 (14 CCR), § 896 (a) describes the purpose of the Forest Practice Rules is to implement the provisions of the Z'berg-Nejedly Forest Practice Act of 1973 in a manner consistent with other laws, including the California Environmental Quality Act (CEQA). The THP process substitutes for the EIR process under CEQA. The purpose of an EIR is to provide public agencies and the public in general with detailed information about the potential, significant effects a proposed project is likely to have on the environment:

- It is the intent of the Legislature that all agencies of the state government which regulate activities of private individuals, corporations, and public agencies which are found to affect the quality of the environment, shall regulate such activities so that major consideration is given to preventing environmental damage, while providing a decent home and satisfying living environment for every Californian (Cal. Pub. Resources Code, § 21000 (g)).
- Documents prepared pursuant to this division be organized and written in a manner that will be meaningful and useful to decision makers and to the public (Cal. Pub. Resources Code, § 21003 (b)).

CDFW's role is as trustee agency in the THP review process, having jurisdiction by law over natural resources affected by the project (14 CCR § 15386). CDFW reviews each THP for significant effects on the environment (14 CCR § 15382) and considers direct and indirect impacts of the project (Cal. Pub. Resources Code § 21065). One of the basic purposes of CEQA is to inform government decision makers and the public about the potential, significant environmental effects of proposed activities and to disclose to the public reasons why a government agency approved a project (14 CCR § 15002 (a)(1) and (4)). The public plays a critical and involved role in the CEQA process.

A Notice of Intent to Harvest Timber (Notice of Intent) includes a map of the approximate boundary of the THP area, and a statement that the public may review the

Plan and that questions or concerns regarding the specific Plan should be directed to the applicable CAL FIRE Review Team Office for public input into an Official Response Document (14 CCR § 1032.7). The Notice of Intent is sent to all property owners within three hundred feet of the Plan boundary and within 1,000 feet downstream of certain watercourses (14 CCR § 1032.7 and 1032.10). In addition, the Notice of Intent is posted in a conspicuous location on the public road nearest the plan and is published in a newspaper of general circulation in the area affected by the proposed project (14 CCR § 1032.7 and 1032.10).

Because there is no requirement in the FHCP to disclose FHCP requirements/mitigations within the THP, CDFW recommends the FEIS evaluate how the Service will monitor for compliance the FHCP mitigations including the TREE program, NSO disturbance buffers, and incidental take in a timely matter (i.e., before timber is harvested) and on a site-specific basis **(Recommendation 45)**. Since CDFW reviews each THP site-specifically for significant effects on the environment, it will also review for compliance and effectiveness the proposed FHCP mitigation measures required to be included in the THP during a desk review and/or pre-harvest inspections on the ground. CDFW will be responsive to any public concerns about the THP regarding significant environmental issues. For example, an adjacent landowner will be notified through the THP review process and have opportunity to comment about the site-specific circumstance at this time. They may have information about a NSO in or near their property, which timber operations may adversely affect.

The disclosure of certain information in THPs is necessary to address any public concerns and evaluate for compliance FHCP disturbance buffers and habitat requirements in real time. Absent of information or receiving information too late (i.e., in the annual report) may run the risk of not catching mistakes until the timber is harvested or NSOs have been affected. Requiring information in THP Section II, Operational Provisions, will make the NSO restrictions in the FHCP: (a) enforceable, (b) reviewable on a site-specific and THP-specific basis by agencies and the public, (c) will inform the LTO and hold them accountable for any violations, and (d) and may catch and correct mistakes before trees are harvested. If any NSO AC locations change prior to timber operations, information relevant to those locations may be updated in the THP, as a minor amendment. CDFW recommends the following information be included within the THP **(Recommendation 46)**:

For the TREE program:

- The method and level of tree retention for each unit
  - Conifer dominated with or without Riparian Management Zone (RMZ) area
  - Hardwood dominated with or without RMZ area
- The number of scorecard trees =/>7 for conifer and hardwood
- The number of Green Wildlife Trees (GWT) for conifer and hardwood

- # acres in unit and silviculture prescriptions in unit
- # and acreage of Habitat Retention Areas (HRA) in unit and HRA placement description
- Average diameter of trees in the THP area

For disturbance buffers and take:

- Map of all NSO ACs within 0.5 miles of the THP with disturbance buffers (500 foot and .25 mile) and DCA boundaries (if applicable)
- NSO pre and post habitat maps at potential take sites and DCAs, which will include:
  - Habitat typing (nesting/roosting/foraging)
  - Acres pre and post-harvest in 500 foot and .5 mile buffers
- Description of take (is this a take site or not?)
- Is the site active or vacant?
- Is the site in a peripheral area (with no take)?

Reporting Requirements in the Annual Report

Implementation Commitment Three (FHCP Chapter 5, page 70) includes topics that will be summarized in the annual report and an example of the anticipated annual report content. CDFW has reviewed the current format of the NSO annual report under the 1992 NSO HCP. The 1992 NSO HCP annual report mainly provides information in summaries and tables. In several areas, it was difficult for CDFW to determine compliance with HCP measures due to the lack of raw data and maps. If the annual report is the only means for the Service to review for compliance and efficacy of the FHCP, there needs to be specific and enforceable language. It does not appear that changes to that format are proposed in the FHCP. The majority of the FHCP example of anticipated annual report content consists of data summaries, leaving room for interpretation and does not provide the ability to determine compliance with the FHCP requirements. CDFW concludes, based on the lack details in FHCP annual reporting requirement, that FHCP compliance cannot be evaluated in the annual report in the following areas: NSO survey data, performance criteria to document take, site occupancy, DCA replacement sites, and additional spot calling and second year surveys:

<u>NSO Survey Data</u>

FHCP Section 5.3.3.1 and Appendix F.2.1 describes that all stands scheduled for timber harvest must be surveyed during the NSO breeding season. The objectives of these surveys are to avoid disturbing individual NSOs in a manner that could negatively impact their ability to successfully reproduce, to avoid any direct harm to adult birds, their eggs, nestlings, or dependent fledged young, and to avoid habitat modification that

would result in an unscheduled direct or indirect take. Currently the annual report provides the "results of NSO THP surveys" in the Appendices. Receiving only the "results" of THP surveys does not provide specific information on the contact location within the THP, follow-up results, and the spatial arrangement of the call stations around the THP.

Performance Criteria to Document Take

A final determination of whether or not an NSO was taken will depend on post-harvest performance criteria based upon the occupancy and/or reproduction of an NSO at a site (FHCP Section 6.2.4.1). A determination of whether take did not occur can be made beginning of the third and ending at the fifth breeding season following the last harvest that triggered the assessment (FHCP Section 6.2.4.1). If the NSOs move their nest site or activity center outside the perimeter of the 153-acre polygon following a timber harvest that triggers a take assessment, the site will be considered for designation of a new NSO site (Chapter 6.2.4.3). Currently the annual report proposes a "take summary," which includes "take accounting." There is no requirement to demonstrate, visually, where the NSO relocated in subsequent years in relation to timber harvest. The Service and/or the public cannot review or monitor for compliance this mechanism of take without a map depicting where the NSO moved within its core and home range following timber harvest.

Site Occupancy

According to the FHCP, a take assessment will not be triggered if the NSO site is determined vacant. A vacant site is defined as unoccupied for three consecutive years or five consecutive years if influenced by Barred Owls (Chapter 6.2.4.8). Currently, there is a requirement under the FHCP "NSO monitoring" section to disclose "site occupancy" in the annual report. However, this language does not require the reporting of the data that determined site occupancy. Without information on Barred Owl occurrences at NSO sites and the NSO survey data for prior years night time calling and daytime stand searches, the Service will be unable to monitor for compliance whether NSO sites are in fact vacant and a take assessment is not necessary (FHCP Section 6.2.4.8).

DCA Replacement Sites

Maintaining a DCA or choosing a potential replacement depends on biological thresholds for the sites (mean annual occupancy $\geq$0.75 and mean fecundity $\geq$0.25) averaged over the last four years (Chapter 5.3.1.4.4). Currently the NSO annual report only requires yearly disclosure of NSO DCA "monitoring, designation, spatial distribution, replacement." For DCA replacement sites, how will the Service monitor for

compliance that the DCA replacements meet the occupancy and fecundity requirements without requiring the biological thresholds averaged for the last four years?

Additional Spot Calling and Second Year Surveys

NSO surveys from one year are valid until March 1 of the following year (assuming the THP does not require a two-year survey). There are different survey requirements (level of intensity) in the FHCP dependent on the amount of contiguous timber and if the harvest is continuous. “Continuous” harvest refers to timber falling and operations that are initiated on or before February 21 and continue without a substantial break (generally a week or less) (FHCP F.2.1.15). This infers that timber operations could stop for up to seven days and resume without any NSO surveys. There is an assumption that the longer the unit goes without operations, the higher the risk for colonization by an NSO, and thus timber operations should cease until the area is cleared for NSO through surveys. There is no requirement in the annual report to list and track THPs and the dates of continuous operations after February 21. It appears the Service will be unable to monitor for compliance the survey requirements and the potential for take in the second year of timber operations under the continuous operations criteria (i.e., THPs and associated dates after February 21 in which timber was harvested).

It is unclear how the Service will monitor for FHCP compliance NSO survey data, performance criteria to document take, site occupancy, DCA replacement sites, and additional spot calling and second year surveys. CDFW recommends the FHCP for Annual Reports (Chapter 5, page 70) be revised to include the following specific information in the annual report content for full disclosure and compliance monitoring **(Recommendation 47)**:

- NSO Monitoring
  - Site Occupancy: Include every single owl site on GDRCo, with GDRCo name and California Natural Diversity Database (CNDDB) number (if this is not provided in the Appendix), the Activity Center status of the NSO site each year for the prior 5 years, and the site selection (current site status and change, if any, e.g. active, vacant).
  - Reproductive success: Include mean fecundity and occupancy for last four years.
- Appendices
  - Summary of survey results for all call stations, divided into THP stations (with THP name and number) and demographic survey stations.
  - Summary of night contacts and follow up results.
  - List of vacant and active sites.

  - Survey data (night survey contacts, daytime contacts, and Barred Owl detections within 0.5 miles) for prior 5 years for any sites that change in status to vacant and for removed displacements.
  - Summary of Barred Owls in NSO sites.
    - Table of each active and vacant owl site and Barred Owl detections within .5 mile each year for prior 5 years.
  - NSO AC status summary (date, begin and end time, status of visit).
  - GDRCo owl site name and corresponding CNDDB number.
  - Table with THP and dates after February 21st in which timber operations occurred.
- Maps/Spatial data
  - Map of NSO call stations surveyed with NSO sites (include 500 foot and .5 mile buffer) and THP boundaries (include 0.5 mile buffer).
  - NSO AC Map with topography, nest/roost/forage habitat, DCA boundary (if applicable), and 500 foot and .5 mile buffers.
  - NSO pre and post habitat at potential take sites and DCAs.
    - Include acreage estimates.
    - Include 500 foot and 0.5 mile buffers.
  - NSO displacements and performance criteria to document take.
    - Include a map of the NSO AC with 500 feet and 0.5-mile buffer, the 153-acre core polygon, where timber harvest occurred, and where the NSO was relocated in subsequent years. The map should include habitat typing (age) and topography.

14) <u>Survey Methodology</u>

FHCP Section 5.3.3.1 and Appendix F.2.1 describe that:

> "…all stands scheduled for timber harvest must be surveyed during the NSO breeding season. The objectives of these surveys are to avoid disturbing individual NSOs in a manner that might negatively impact their ability to successfully reproduce, to avoid any direct harm to adult birds, their eggs, nestlings, or dependent fledged young, and to avoid habitat modification that would result in an unscheduled direct and indirect take."

The number of surveys GDRCo performs around THPs and NSO sites is determined based on calculators (developed with data on their ownership) that achieves an overall detection probability of 95%.

While a calculator was developed for THPs and NSO sites, one is not apparent for additional spot calling and second year surveys (FHCP F.2.1.15). “Continuous” harvest refers to timber falling and operations that are initiated on or before February 21 and continue without a substantial break (generally a week or less) (FHCP F.2.1.15). There are different survey requirements (level of intensity) in the FHCP dependent on the amount of contiguous timber and if the harvest is continuous. In this second year, timber falling could stop for up to seven days and then begin again without the requirement of a protocol level survey (i.e. using the THP calculator).

CDFW is concerned about the potential for take under the circumstance where NSO may move into a THP unit during continuous falling of trees that may have a seven day gap in operations. There is an assumption that the longer the unit goes without operations, the higher the risk for colonization by an NSO, and thus, timber operations should cease until the area is cleared for NSO through surveys. CDFW recommends the number of days timber operations can be stopped without requiring protocol surveys should reanalyzed, disclosed, and mitigated as potential take **(Recommendation 48)**. Allowing timber operations to continue into the breeding season with potentially no, or limited (concurrent), NSO surveys could result in undisclosed effects to nesting birds (e.g., eggs may be abandoned). CDFW recommends the FEIS evaluate all of the survey requirements in FHCP F.2.1.15 (Additional Spot Calling and Second Year Surveys) for their ability to achieve a detection probability of 95% **(Recommendation 49)**.

15) Permanence of Owl Sites

FHCP Section 6.2.4.9 has criteria for an NSO site being vacant and active, which ultimately has implications for if a take assessment is warranted when harvesting timber in the area. Increased survey effort is necessary to achieve a 95% probability of detecting a NSO in areas invaded by the Barred Owl, a competitor to the NSO. GDRCo's THP calculator assumes Barred Owl presence in its calculator, but the NSO site calculator is different, resulting in more or less surveys depending on if Barred Owls are present. The FHCP considers NSO sites vacant if they are unoccupied by NSOs for three consecutive breeding seasons. However, if the site is influenced by Barred Owls, NSO sites are considered vacant if they are unoccupied by NSOs for five consecutive years. NSO sites are determined to be influenced by Barred Owls if they are “...repeatedly seen or heard at the site without being removed, or Barred Owls recolonize the site so rapidly that NSO have a limited opportunity to colonize the site.”

Determining if an NSO site is influenced by Barred Owl based on Barred Owls being “repeatedly seen or heard at the site” (FHCP Section 6.2.4.9) is a vague requirement. Since surveying to determine the permanence of owl sites is dependent on the status of Barred Owls in the area, the FHCP needs clear criteria for determining Barred Owl

presence in an NSO site. CDFW recommends the FHCP include spatial and temporal requirements for determining if a NSO site is influenced by Barred Owls **(Recommendation 50)**.

16) Determining New NSO Sites for Take Assessments

FHCP Section 6.2.4.4 has criteria for establishing a new NSO activity center (AC):

- A pair is detected at least two times in the same core area over at least 1 month (30 days).
- A single NSO is detected in the same core area over at least 2 months (60 days).
- An NSO response obtained during a THP survey is not followed-up adequately using the protocols described previously in Section 6.2.1. (Note: this designation of site status only applies relative to take assessment; for demographic purposes, the site status would be “unknown”).

The current NSO Survey Protocol (USFWS 2011b) and FHCP Section F.2.1.17 are consistent in the criteria for determining AC status. These criteria are typically used by CDFW and the Service for establishing a new AC on a site-specific basis. However, the FHCP Section 6.2.4.4 has criteria for establishing a new AC that are not based on the Protocol. The origin of the criteria in FHCP Section 6.2.4.4, and the validity of it for establishing new ACs, are unclear. CDFW is concerned that the FHCP Section 6.2.4.4 language may not establish ACs where they may be warranted (i.e., as currently recommended in the Protocol). For example, the Protocol considers multiple responses over several years from the same general area when determining the AC status and establishing a new AC. CDFW recommend the FEIS provide an assessment of the origin and validity of using this set of criteria found in FHCP Section 6.2.4.4 for establishing new ACs that differs from the standards in the Protocol **(Recommendation 51)**.

17) Measures for Changed and Unforeseen Circumstances in the Plan Area–Fire

FHCP Section 5.4.2 discusses fires covering more than 1,000 acres but less than 10,000 acres. FHCP Section 5.4.2 allows salvage logging trees in functional DCAs after a fire. If more than 51% of previously standing timber within or immediately adjacent to a DCA is damaged in fire, GDRCo will contact the Service within 30 days of its discovery to determine if the DCA remains functional. If the DCA is functional, GDRCo may conduct salvage logging operations on downed or dead trees in the DCA, while retaining structural features that contribute to future habitat for Covered Species (FHCP Section 5.4.2).

NSOs have high site fidelity and may utilize areas of moderate- to high-severity burn for foraging, or may take refuge temporarily in pockets of low-severity burn. Since the relationships between NSOs and habitat post-fire is complex, depending on where the fire burned and it's severity, post-fire salvage logging in DCAs should be evaluated on a site-by-site basis. CDFW recommends revision of the FHCP to state that GDRCo consult with the Service for any post-salvage harvest operations in functional DCAs **(Recommendation 52)**.

18) Fisher

A GDRCo radio telemetry study to quantify denning and resting areas used by fishers in 1996 and 1997 had the following outcomes for Fisher den and rest site habitat (Chapter 4, page 33, numbers approximate-converted from centimeters to inches):

- Natal den cavities were in trees that had a mean DBH of 30.12 inches (with standard deviation, 24.61 inches to 37.52 inches).
- Maternal cavities were in trees that had a mean DBH of 44.09 inches (with standard deviation, 24.61 inches to 72.60 inches).
- Rest site cavities were in trees that had a mean DBH of 33.3 inches (with standard deviation, 8.8 inches to 68.9 inches).

Under the TREE program, the scorecard will not score a tree for retention tree if it has an internal hollow or large cavity and is under 30 inches DBH for conifers and 18 inches DBH for hardwoods. Since the above data indicate fisher are utilizing cavities in smaller (<30-inch conifer or <18-inch hardwood) trees as well, it is unclear:

- What is the distribution and abundance of large trees with cavities currently on the landscape and how that is sufficient to support a viable population of fisher?
- Without retaining smaller trees with large cavities (that the above data indicate fishers may use), how will larger trees with cavities develop and be recruited on the landscape (especially outside RMZ's and unstable areas) into the future?

The above data indicate larger trees with cavities are the most important habitat element for fisher. However, the FHCP and FEIS lack an assessment as to whether only retaining larger trees with cavities is enough habitat on the landscape to support a viable fisher population. Currently, fisher are using smaller trees with cavities, and the effect of removing smaller trees with cavities may have negative implications for fisher populations.

Even-aged harvesting and lack of trees (small and large) with cavities retained on the landscape may reduce habitat quality for fisher in the future, reduce the recruitment of larger trees with cavities, and thus reduce the amount of habitat from what is currently

available. This may also cause habitat fragmentation, especially in upland areas and over ridges, and reduced gene flow. Lacking an assessment of the effect of removing this habitat utilized by fishers as maternal, den, and rest sites, the project could substantially adversely affect fisher by resulting in decline including local or regional extirpation.

To reduce impacts to fisher to less than significant CDFW recommends the following:

- Increase the number of points in the live scorecard for internal hollow or large cavity from 4 to 5. This will increase the number of smaller trees (<30 inches DBH) on the landscape with large cavities, providing recruitment for the larger trees where they are scarce **(Recommendation 53)**.
- In conifer-dominated harvest areas with RMZ retention, if the unit is lacking hardwoods to meet minimum retention standards (two trees per clear-cut acre), conifers should be retained to meet this requirement **(Recommendation 54)**.

19) Tree Vole

Sonoma and red tree voles are Covered Species under the FHCP. Tree voles are also CDFW Species of Special Concern (SSC). CDFW classifies species as SSC if they are vulnerable to extinction due to declining population levels, limited ranges, and/or continuing threats.

Tree voles are vulnerable to logging and other disturbances that reduce the extent and contiguity of old forests (Carey 1991, Huff et al. 1992, Hayes 1996, Adam and Hayes 1998). Some tree vole populations occur in intensively managed landscapes with little old forest, including within the Plan Area (e.g., Thompson and Diller 2002). However, the Service (USFWS 2011c) noted that “the limited evidence available suggests that tree vole occupation of younger forest stands may be relatively short-lived (Diller 2010, pers. comm.) or intermittent (Hopkins 2010, pers. comm.).” Based on the natural histories of these species, reducing old forest could negatively affect them; but retention of older Douglas-fir trees and patches of well-connected canopy might ameliorate those impacts. Clear-cutting and other severe disturbances should have the strongest effects on tree voles, because of their diet, nesting habitat associations, arboreal mode of travel, and apparently poor vagility (movement capability). For these same reasons, thinning likely also negatively affects tree voles (Wilson and Forsman 2013). Further research of tree vole ecology, methods of study, and management is needed. For example, ground-based surveys often miss small nests, which could lead to underestimating population size or allow inappropriate management activities to occur in occupied areas (Swingle 2005).

The FHCP (Section 5.3.2) only directly ensures protection of tree voles through the "vole nest factor" in the wildlife scorecard in the TREE program, which stipulates "tree containing an active or remnant tree vole nest having canopy connectivity with existing RMZ/Geological retention (2 points) and all others (1 point)." CDFW is concerned that the vole nest factor alone may not provide adequate protection for these species. CDFW recommends additional residual, defective, or decadent trees be retained for tree voles. This could be particularly important for tree voles because their nests can be difficult to locate from the ground (e.g., during THP layout), so there is a potentially high likelihood in some stands of not applying the vole nest factor to trees that in fact contain tree vole nests. Some additional retention of suitable trees may also be needed to protect adjacent trees for foraging (generally, Douglas-fir with branches that intersperse with those of the nest tree), and for potential future nest trees. Larger, older, more decadent or deformed trees should be prioritized, with particular emphasis on Douglas-fir. Defective trees are particularly important to retain for tree voles. Research on GDRCo found that 71% of tree vole nests (for which the structure was determined) were in defective trees (e.g., broken or forked tops; FHCP Appendix C, Chapter 3). **(Recommendations 55 and 56).**

The FHCP proposes to use presence of tree vole remains in NSO pellets as an index of occupancy for monitoring tree vole populations in the Plan Area (FHCP Section 5.3.5.3). Adaptive management (red light) for tree voles would be triggered if there's a statistically significant decrease in occupancy estimates for tree voles for at least 5 consecutive years. Past research on GDRCo land indicated that tree voles comprise approximately 15% of the NSO's diet by frequency. In the past, GDRCo collected approximately 200 NSO pellets annually. The number of pellets collected could decline with decreased survey/monitoring effort for NSOs after model validation (<100% surveys, possible end of the demographic study). Will enough pellets with tree voles be collected annually and across large enough portions of the Plan Area to monitor trends in tree vole populations in both a statistically and biologically meaningful way? CDFW recommends the FEIS evaluate whether occurrence of tree voles in NSO pellets will be an appropriate method for monitoring the tree vole population in the Plan Area. **(Recommendation 57).**

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ATTACHMENT 2:
CDFW RECOMMENDATIONS

Recommendations 1–5 (Habitat Fitness Potential Modeling, Set-Asides [See Comment Section 1])

1) **In Comment Section 1, CDFW reviewed the relevant scientific literature concerning Habitat Fitness Potential (HFP) modeling for Northern Spotted Owls (NSOs). CDFW also reviewed a letter from Dr. Alan Franklin (who developed this modeling approach) to the Service (see Attachment 3), regarding the appropriate application and interpretation of HFP modeling for NSOs. The FEIS should evaluate the appropriateness of using territory-scale HFP modeling as a basis for large-scale conservation planning in the FHCP. The Service should consult with a third-party quantitative NSO ecologist (such as a principle investigator of an NSO demographic study) on HFP modeling to inform the FEIS evaluation of this technically complex information.**

2) **The FEIS should evaluate the appropriateness of comparing modeled projections of future HFP to trends in estimated abundance for monitoring the effectiveness of the FHCP's conservation strategy.**

3) **The FEIS should evaluate the HFP modeling's implications for conservation of NSOs in the Plan Area additional to the importance of habitat edge; for example, in regard to the size, shape, and clustering of nesting/roosting habitat patches associated with high survival and fitness.**

4) **The FEIS should evaluate the FHCP's conservation strategy (e.g., "dendritic" habitat retention) and mitigation for take (DCAs, rather than set-asides) in light of GDRCo research showing the importance of set-asides to NSOs in the Plan Area.**

5) **The FHCP should be amended to state that set-asides will be retained for NSOs until the HFP modeling is appropriately validated.**

Recommendations 6 and 7 (Threshold Amounts of Habitat [see Comment Section 2])

6) **The FEIS should evaluate the appropriateness of 89 acres of nesting/roosting habitat and 233 acres of suitable habitat (foraging + some nesting/roosting) as thresholds for reporting take and for protecting DCAs. These thresholds were selected from the lower end of the distribution of**

habitat conditions (mean -1SD) in a single study (Folliard 1993) and are not congruent with the findings of numerous research studies conducted since 1992.

7) **If one or both of the habitat thresholds identified for DCA retention (89 and 233 acres) is/are not supported by the best available science, the FHCP should be amended to change the threshold(s) to one(s) that is/are supported.**

Recommendations 8 and 9 (Habitat Categories for Thresholds [see Comment Section 3])

8) **The FHCP's habitat definitions for NSOs have relatively low age thresholds and do not incorporate structural characteristics shown to be important to NSOs. The FEIS should evaluate whether the FHCP should use additional habitat categories for take avoidance and protection of DCAs (e.g., "high-quality nesting/roosting" as well as total nesting/roosting).**

9) **If the FEIS determines that additional habitat categories are needed to ensure that take is avoided and DCAs are adequately protected, the FHCP should be amended to include the FEIS' recommended habitat categories.**

Recommendations 10–16 (Retention of Targeted Habitat Elements [see Comment Section 4])

10) **As reviewed in CDFW Comment Section 4, research on GDRCo land showed that individual older, decadent, or deformed trees, patches of older residuals, and total basal area of older residual trees in the stand are important to nesting NSOs, in terms of both habitat selection and reproductive success (reviewed in FHCP Appendix C). CDFW recommends revising the FHCP to include enforceable language to prioritize the retention of the highest scoring trees (Appendix E, page 11 Live Tree Retention Scorecard and Definitions) when selectively harvesting in RMZs. Residuals (defined in Appendix E, page 12) should be prioritized over non-residuals when they meet the same scorecard criteria.**

11) **FHCP Appendix E (page 16) for Candidate Tree Selection states "retain trees with the average diameter equal to or greater than the average diameter of trees in the THP area." THP area is not defined and CDFW is concerned that this could include areas outside the THP boundary. CDFW recommends defining "THP area" in the FHCP, or delete "area" from this sentence.**

12) As reviewed in CDFW Comment Section 4, research on GDRCo land showed that individual older, decadent, or deformed trees, patches of older residuals, and total basal area of older residual trees in the stand are important to nesting NSOs, in terms of both habitat selection and reproductive success (reviewed in FHCP Appendix C). CDFW recommends revising the FHCP to make it an enforceable standard to prioritize the highest scoring trees (Appendix E, page 11 Live Tree Retention Scorecard and Definitions) when choosing green tree retention (HRA's, tree clumps, or scattered trees). Residuals (defined in Appendix E, page 12) will be prioritized over non-residuals when they meet the same scorecard criteria.

13) The FHCP does not require the retention of NSO nest trees. In FHCP Appendix F (page 10) it states "…if a nest is found, the nest tree will be marked." Since the NSO nest trees once provided a suitable structure for NSO to nest, it should be retained indefinitely for future use by NSOs or other covered species. CDFW recommends the Service revise to FHCP to state that "…if a nest is found, the nest tree will be marked <u>and retained</u>."

14) CDFW recommends the FEIS compare the kinds of structural retention supported by researchers on GDRCo land and elsewhere with the FHCP's requirements for retention of targeted habitat elements (i.e. TREE).

15) A requirement of the current (1992) NSO HCP is for GDCRo to report pre- and post-harvest estimates of snags and residual trees in timber harvest plans in the annual report (Simpson 1992, page 202). To evaluate the effectiveness of the TREE program, CDFW recommends the FEIS use the existing data to analyze the rate of loss of residual trees in THPs since the TREE program's implementation.

16) CDFW recommends adding enforceable language to the FHCP to monitor the effectiveness of the tree retention standards (e.g., TREE program) under FHCP Goal Two and report the results to the Service.

<u>Recommendations 17–24 (Selection and Protection of DCAs [see Comment Section 5])</u>

17) Revise the FHCP's initial set of DCAs so that every initial DCA has recently high occupancy and fecundity, as defined by the FHCP's criteria for selecting replacement DCAs.

18) Revise the FHCP's initial set of DCAs so that they are better distributed (e.g., in the Plan Area, among OMUs, and in relation to the current distribution of active NSO sites).

19) Amend the FHCP to state that replacement DCAs may be selected from adjacent OMUs, regardless of whether or not the DCA being replaced is near the OMU boundary.

20) Revise the FHCP's initial set of DCAs, and/or redraw the core habitat polygon within currently selected DCAs, so that every DCA has a core habitat polygon that is at least as large as the FHCP's take avoidance threshold for nesting/roosting habitat (currently, ≥89 ac).

21) Revise the FHCP's initial set of DCAs so that every DCA has a core nesting/roosting habitat patch that is at least as large as the FHCP's take avoidance threshold for nesting/roosting habitat (currently, ≥89 ac).

22) Amend the FHCP so that it is more clear whether the no-take standard will be applied: (a) within 0.5 mile of the center of the DCA (including protection of 233 acres of forest ≥31 years), (b) the Activity Center, which may or may not be located in or nearby the DCA with which it is associated, or (c) both.

23) Amend the FHCP so that is clear whether DCAs can be selected within 0.5 mile of GDRCo property boundaries, and if so, how they are protected from take associated with off-property activities.

24) The FEIS should evaluate whether DCAs located nearby property boundaries are adequately protected from off-property activities. If they are inadequately protected, the initial set of DCAs should be revised to only include NSO sites >0.5 mile from a property boundary.

Recommendations 25–29 (Barred Owl Experiment [see Comment Section 6])

25) The FEIS should evaluate whether comparison with the Willow Creek Study Area is an appropriate benchmark for completion of Phase 2 of the Barred Owl experiment, when there is no guarantee that the Willow Creek Study will continue throughout Phase 2.

26) The FEIS should evaluate whether validation of the HFP modeling is an appropriate benchmark for completion of Phase 2 of the Barred Owl experiment, given concerns about the potential inappropriateness of using that modeling as a basis for the FHCP's conservation strategy (also see CDFW Comment Section 1).

27) The FEIS should more clearly describe and evaluate the value of the Barred Owl experiment as mitigation for take, in light of the relatively short

timeframe within which Barred Owls will be completely removed from the Plan Area (i.e., Phase 2) versus undetermined portions of the Plan Area (i.e., Phase 3).

28) **The FEIS and FHCP should include more detailed descriptions of Barred Owl experiment Phases 2 and 3.**

29) **The FHCP should be amended to include a statement that a scientific panel will be consulted for input on the best locations for treatment and control areas during Barred Owl experiment Phase 3. This will help ensure that the experiment's scientific value is maximized and that areas with high densities of NSO territories and habitat are protected from Barred Owl impacts.**

Recommendations 30–33 (Take Accounting and Estimation [see Comment Section 7])

30) **The FEIS should evaluate the FHCP's method for "returning" displacements (take) based on occupancy, which may inadequately reflect negative impacts of take on a taken site's original occupants, and which could inaccurately reflect habitat quality in the site.**

31) **The FEIS should determine if the FHCP's habitat thresholds for reporting take are appropriate in light of the best available science and, if they are not, whether the FHCP accurately estimates the annual rate of take and cumulative take during the Plan's term.**

32) **The FEIS should determine if the FHCP's habitat categories (forest ≥31 years and ≥46 yrs) for reporting take are appropriate in light of the best available science and, if they are not, whether the FHCP accurately estimates both the annual rate of take and cumulative take during the Plan's term.**

33) **The FEIS should evaluate whether changes to the conservation strategy and mitigation measures in the FHCP compared with the 1992 HCP could lead to changes in the rate of take. For example, whether the risk of take differs with retention of nesting/roosting habitat in narrow, "dendritic" RMZs compared with the past: (a) retention of patches with more interior forest, (b) association with relatively large, no-take set-asides, and (c) association with residual older trees outside RMZs. In light of these findings, the FEIS should evaluate whether the FHCP accurately estimates the annual rate of take and cumulative take during the Plan's term.**

Recommendations 34 and 35 (Disturbance of NSOs [see Comment Section 8])

34) CDFW recommends FHCP Section 6.2.4.7 be amended to clearly state seasonal disturbance buffers shall be applied to nesting NSOs affected by any Covered Activity that may lead to a disruption of breeding behaviors that could result in death of young or eggs. The 2006 USFWS guidelines would be the appropriate source for determination of activities that may have such an effect.

35) The FHCP should disclose and evaluate the estimated level of take that would occur from noise and visual disturbance

Recommendations 36–38 (Take and Mitigation in the Adjustment Area [see Comment Section 9])

36) CDFW recommends the FEIS include a discussion on the potential effects to NSOs currently located within the 339,667-acre Adjustment Area if these sites are added to the Plan Area and subsequently available for take under the FHCP.

37) CDFW recommends FHCP Section 1.4.7.2.3 incorporate a discussion of NSO activity sites within the Adjustment Area including a provision for assessing DCA additions within the new area.

38) CDFW recommends additional information relevant to the FHCP covered species for lands added to the Plan Area (as required by FHCP Section 1.4.7.2.3) include information related to NSOs, other Covered Species, and their habitat. The current language states the additional information including water temperature, channel and habitat type, large woody debris inventory, and estuarine conditions shall be submitted to the Service. Terrestrial habitat information is not mentioned, and thus appears to be an oversight retained from the Aquatic HCP.

Recommendation 39 (Direct Harm of NSOs [see Comment Section 10])

39) The FHCP and FEIS should use a standardized detection probability analysis to establish the estimated number of nesting birds that may be directly affected as a result of the survey methodology, which would account for the probability of missing nesting during surveys, rather than the probability of physically seeing birds after missing nesting.

Recommendation 40 (Sustainable NSO Population Size [see Comment Section 11])

40) CDFW recommends the FEIS provide an analysis estimating the intended population size and number of occupied NSO sites required to ensure a stable, sustainable population of NSOs within the Plan Area, including the potential Adjustment Area. This evaluation should also include consideration of the potential for numbers of individuals or sites to continue to decline during an undetermined number of years (e.g., >5 years) after adaptive management is triggered.

Recommendations 41–43 (Adaptive Management of NSOs [see Comment Section 12])

41) To ensure successful implementation of the Adaptive Management's Scientific Review Panel (FHCP Section 5.3.6.1), CDFW recommends adding a statement that if the Service and GDRCo cannot come to agreement on the members of the scientific review panel, then the Service and GDRCo will each choose one member and agree on the third.

42) Because other landscapes or ownerships may not have the same objectives or habitat conditions as the plan area, comparing fecundity estimates to a "comparable region" is an uncertain measure (Adaptive Management commitment Two [Objective 5C]).CDFW recommends the FHCP identify a mean fecundity rate based on what is intended for the plan area.

43) FHCP 5.3.6.2 establishes an Adaptive Management Reserve Account (AMRA) to create habitat adjustments during the life of the FHCP. The AMRA appears to limit no more than 1,068 acres added during the life of the FHCP. CDFW recommends the FHCP not identify an upper limit on habitat mitigation measures, but rely on the outcomes of the scientific review panel.

Recommendations 44–47 (Reporting, Monitoring, and Compliance [see Comment Section 13])

44) It appears that there are no mechanisms for requesting additional annual meetings and information/disclosure in the annual reports or compliance reporting. CDFW recommends revising the FHCP Implementation Commitments to include "The Service may require annual meetings or the submittal of additional information as necessary to determine compliance with the FHCP at any time."

45) **Because there is no requirement in the FHCP to disclose FHCP requirements/mitigations within a THP, CDFW recommends the FEIS evaluate how the Service will monitor for compliance the FHCP mitigations including the TREE program, NSO disturbance buffers, and incidental take in a timely matter (i.e., before timber is harvested) and on a site-specific basis.**

46) **Requiring information in THP Section II, Operational Provisions, will make the NSO restrictions in the FHCP: (a) enforceable, (b) reviewable on a site-specific and THP-specific basis by agencies and the public, (c) will inform the LTO and hold them accountable for any violations, and (d) and may catch and correct mistakes before trees are harvested. CDFW recommends the following information be included within the THP:**

- **a. For the TREE program:**
  - **i. The method and level of tree retention for each unit**
    1. **Conifer dominated with or without Riparian Management Zone (RMZ) area**
    2. **Hardwood dominated with or without RMZ area**
  - **ii. The number of scorecard trees =/>7 for conifer and hardwood**
  - **iii. The number of Green Wildlife Tree (GWT) for conifer and hardwood**
  - **iv. # acres in unit and silviculture prescriptions in unit**
  - **v. # and acreage of Habitat Retention Areas (HRA) in unit and HRA placement description**
  - **vi. Average diameter of trees in the THP area**
- **b. For disturbance buffers and take:**
  - **i. Map of all NSO ACs within 0.5 miles of the THP with disturbance buffers (500 foot and .25 mile) and DCA boundaries (if applicable)**
  - **ii. NSO pre and post habitat maps at potential take sites and DCAs, which will include:**
    1. **Habitat typing (nesting/roosting/foraging)**
    2. **Acres pre and post-harvest in 500 foot and .5 mile buffers**
  - **iii. Description of take (is this a take site or not?)**
  - **iv. Is the site active or vacant?**
  - **v. Is the site in a peripheral area (with no take)?**

47) **It is unclear how the Service will monitor for FHCP compliance NSO survey data, performance criteria to document take, site occupancy, DCA**

replacement sites, and additional spot calling and second year surveys. CDFW recommends the FHCP for Annual Reports (Chapter 5, page 70) be revised to include the following specific information for full disclosure and compliance monitoring:

- **a. NSO Monitoring**
  - **i. Site Occupancy: Include every single owl site on GDRCo, with GDRCo name and California Natural Diversity Database (CNDDB) number (if this is not provided in the Appendix), the Activity Center status of the NSO site each year for the prior 5 years, and the site selection (current site status and change, if any, e.g. active, vacant)**
  - **ii. Reproductive success: Include mean fecundity and occupancy for last four years**
- **b. Appendices**
  - **i. Summary of survey results for all call stations, divided into THP stations (with THP name and number) and demographic survey stations**
  - **ii. Summary of night contacts and follow up results**
  - **iii. List of vacant and active sites**
  - **iv. Survey data (night survey contacts, daytime contacts, and Barred Owl detections within 0.5 miles) for prior 5 years for any sites that change in status to vacant and for removed displacements**
  - **v. Summary of Barred Owl in NSO sites**
    1. **Table of each active and vacant owl site and Barred Owl detections within .5 mile each year for prior 5 years**
  - **vi. NSO AC status summary (date, begin and end time, status of visit)**
  - **vii. GDRCo owl site name and corresponding CNDDB number**
  - **viii. Table with THP and dates after February 21st in which timber operations occurred**
- **c. Maps/Spatial data**
  - **i. Map of NSO call stations surveyed with NSO sites (include 500 foot and .5 mile buffer) and THP boundaries (include 0.5 mile buffer)**
  - **ii. NSO AC Map with topography, nest/roost/forage habitat, DCA boundary (if applicable), and 500 foot and .5 mile buffers**
  - **iii. NSO pre and post habitat at potential take sites and DCAs**
    1. **Include acreage estimates**
    2. **Include 500 foot and 0.5 mile buffers**

iv. NSO displacements and performance criteria to document take

1. Include a map of the NSO AC with 500 foot and 0.5-mile buffer, the 153-acre core polygon, where timber harvest occurred, and where the NSO was relocated in subsequent years. The map should include habitat typing (age) and topography

<u>Recommendations 48 and 49 (NSO Survey Methodology [see Comment Section 14])</u>

48) "Continuous" harvest refers to timber falling and operations that are initiated on or before February 21 and continue into the breeding season without a substantial break (generally a week or less) (FHCP F.2.1.15). There are different survey requirements (level of intensity) in the FHCP dependent on the amount of contiguous timber and if the harvest is continuous. CDFW is concerned that NSO may move into a THP unit during a gap in operations, and operations could begin again next to a new nest site. CDFW recommends the number of days timber operations can be stopped without requiring protocol surveys should reanalyzed, disclosed, and mitigated as potential take.

49) CDFW recommends the FEIS evaluate all of the survey requirements in FHCP F.2.1.15 (Additional Spot Calling and Second Year Surveys) for their ability to achieve a detection probability of 95%.

<u>Recommendation 50 (Permanence of Owl Sites [see Comment Section 15])</u>

50) Determining if an NSO site is influenced by Barred Owl based on Barred Owls being "repeatedly seen or heard at the site" (FHCP Section 6.2.4.9) is a vague requirement. CDFW recommends the FHCP include spatial and temporal requirements for determining if a NSO site is influenced by Barred Owls.

<u>Recommendation 51 (Determining New NSO Sites for Take Assessments [see Comment Section 16])</u>

51) The 2011 NSO Survey Protocol (2012 Revision, Protocol) and FHCP Section F.2.1.17 are consistent in the criteria for determining AC status. However, the FHCP Section 6.2.4.4 has criteria for establishing a new AC that are not based from the Protocol. CDFW recommends the FEIS provide an assessment of the origin and validity of using this set of criteria found in FHCP Section 6.2.4.4 for establishing new ACs that differs from the standards in the Protocol.

Recommendation 52 (Measures for Changed and Unforeseen Circumstances in the Plan Area–Fire [see Comment Section 17])

52) Since the relationships between NSOs and habitat post-fire is complex, depending on where the fire burned and it's severity, post-fire salvage logging in DCAs should be evaluated on a site-by-site basis. CDFW recommends revision of the FHCP to state that GDRCo consult with the Service prior to post-salvage harvest operations in functional DCAs.

Recommendations 53 and 54 (Fisher [see Comment Section 18])

53) GDRCo data indicate larger trees with cavities are the most important habitat element for fisher. However, the FHCP and FEIS lacks an assessment as to whether only retaining larger trees with cavities is enough habitat on the landscape to support a viable fisher population. Currently, fisher are using smaller trees with cavities, and the effect of removing smaller trees with cavities may have negative implications for fisher populations. Increase the number of points in the live scorecard for internal hollow or large cavity from 4 to 5. This will increase the number of smaller trees (<30 inches DBH) on the landscape with large cavities, providing recruitment for the larger trees where they are scarce.

54) In conifer-dominated harvest areas with RMZ retention, if the unit is lacking hardwoods to meet minimum retention standards (two trees per clearcut acre), conifers should be retained to meet this requirement.

Recommendations 55–57 (Tree Vole [see Comment Section 19])

55) Tree voles are arboreal, have extremely limited movement capabilities for foraging and dispersing, and are highly associated with defective (e.g., forked or broken-top) trees on GDRCo land. The FHCP should be revised to ensure greater retention of tree vole nest and foraging trees. Greater retention of tree vole nest and foraging trees could be accomplished through:

- **a. Retention of nest trees (option i is preferred):**
  - **i. Retain all trees with active or remnant tree vole nests, or**
  - **ii. Increase the "vole nest factor" on the wildlife tree scorecard to 4 points for trees in RMZs and 3 points for trees outside RMZs**
- **b. Retention of foraging trees (option i is preferred):**
  - **i. Retain all Douglas-fir trees immediately adjacent to retained tree vole nest trees, or**

ii. Retain the largest-diameter Douglas-fir tree immediately adjacent to retained tree vole nest trees, to provide minimum foraging opportunities.

56) The FHCP should be revised to ensure that green tree retention prioritizes trees with the structure (see CDFW Recommendations 10 and 12). For tree voles, the FHCP should specifically include prioritization of defective trees for tree vole nests; for example, broken-top or forked top trees.

57) The FEIS should evaluate whether GDRCo will collect a sufficiently large and well distributed sample of NSO pellets to rigorously monitor tree vole populations in the Plan Area (e.g., for triggering adaptive management).

ATTACHMENT 3:
LETTER FROM DR. ALAN FRANKLIN TO THE SERVICE
CONCERNING HFP MODELING

25 June 2007

Dr. Paul Phifer
Project Manager
Northern Spotted Owl Recovery Plan
U. S. Fish and Wildlife Service
911 N.E. 11th Avenue
Portland, OR 97232-4181

Dear Dr. Phifer:

As requested by Dr. David J. Wesley in his letter of 10 May 2007, I am providing my comments on the Draft Recovery Plan for the Northern Spotted Owl (*Strix occidentalis caurina*). I have confined my comments largely as a response to the three questions that Dr. Wesley posed in his letter. These questions referred to Recovery Criterion #4 (pages 32-36 and 48-51), pages 112-115 of Appendix A, and Appendix D (pages 134-136) where some of my previous research work (i.e., Franklin et al. 2000) was used to develop these sections of the plan. Below, I have responded to each of the questions (indicated in bolded italics) that were posed in the letter from David Wesley.

Does the draft recovery summarize and represent your relevant data and analysis correctly in the sections noted above?

I felt that the draft recovery plan misinterpreted the results of Franklin et al (2000) in terms of relevant use of lambda(h), and of the modeling approach used. I have detailed my concerns below under each of those categories.

Misinterpretation of Scale: The draft recovery plan misinterpreted the scale to which the results in Franklin et al. (2000) apply. Franklin et al. (2000) explicitly stated that their results related to the territory scale only in statements such as:

1. page 542 of Franklin et al. (2000): "*This study focuses on the **territory scale**, specifically in terms of macrohabitat (Block and Brennan 1993): the extent and configuration of vegetation stands within territories*."

2. page 543 of Franklin et al. (2000): "*First, we address whether Northern Spotted Owl survival and reproductive output vary with respect to landscape habitat*

*covariates at the individual **territory scale**.*"

3. Page 578 of Franklin et al. (2000): "*These results are scale dependent in both habitat and landscape extent. In terms of habitat within a **territory scale**, scale is relevant only to discrete habitat patches and not to within-patch variation. In addition, landscape extent in this study is limited to the **territory scale** and not to larger or smaller scales. Therefore, differences (or lack thereof) can only be attributed to the **territory scale**. Other scales such as a home range scale or cluster of territories may produce different results and should be appropriately analyzed*."

4. Page 582 of Franklin et al. (2000): "*Here, we use the term habitat in reference to the landscape configurations of mature and old-growth forests at the **territory scale**, which collectively defined the life history traits and habitat fitness potential.*"

Thus, the scale to which the results of Franklin et al. (2000) apply are very clearly stated throughout the paper. However, the draft recovery plan did not make this distinction at several levels. First, they introduce Franklin et al. (2000) as having "*shifted the paradigm from considering spotted owl habitat at the stand level to the landscape level*" [pages 36 and 51]. However, in introducing landscape scale in relation to spotted owl habitat, they do not explicitly state at which scale (i.e., the territory scale) Franklin et al (2000) measured habitat metrics. In addition, the draft plan states that "*Recent landscape-level analyses in portions of the Oregon Coast and California Klamath provinces suggest that a mosaic of late-successional habitat interspersed with other seral conditions may benefit spotted owls more than large homogeneous expanses of older forests (Zabel et al. 2003; Franklin et al. 2000; Meyer et al. 1998)*" [page 113 in draft recovery plan]. This statement implies that these conditions can be applied across entire landscapes within the provinces, rather than at a territory scale, on which all of the cited studies in this statement were based.

This misinterpretation of scale subsequently led to inappropriate application of the results of Franklin et al. (2000) for land management options in the draft recovery plan. The draft recovery plan uses as it's foundation under Option 1 "*a network of Managed Owl Conservation Areas located in Washington, Oregon, and California*" [page 15] at 2 levels, MOCA 1 supporting 20 or more pairs and MOCA 2 supporting 1-19 pairs [page 16]. In Option 2, only "habitat blocks" are identified [page 23] with two categories supporting the same numbers as the MOCAs. The draft recovery plan then uses results based on Franklin et al. (2000) and other studies (Appendix D of draft recovery plan) to set the percentage of habitat-capable acres in suitable habitat for the MOCAs [page 32-33] under Option 1 and the habitat blocks [pages 48-49] under Option 2. The application of the results from studies on a territory scale to a cluster of territories in the MOCAs and habitat blocks is a clear misapplication of the scale used in

the original studies. The primary reasons why this is inappropriate are detailed further below.

Misinterpretation of Lambda(h):

Franklin et al. (2000) defined λ_H (referred to as lambda(h) in the plan) as the "*fitness conferred on an individual occupying a territory of certain habitat characteristics*" and "*the potential fitness that an individual can achieve if it occupies a particular territory with certain habitat characteristics*" [page 558 in Franklin et al. 2000]. Thus, lambda(h) is an individual measure relative to a defined scale (the territory in the case of Franklin et al. 2000). However, lambda(h) is not necessarily directly comparable to lambda (λ) used as a metric to measure overall population change. As Franklin et al (2000) point out, "*For* λ_H *and* λ *to be roughly equivalent, all territories need to be occupied. Therefore, to understand the relationship between* λ_H *and* λ*, some measure of occupancy on territories needs to be included in some function that also includes* λ_H" [page 581 in Franklin et al. 2000]. To date, this has not been done and the relationship between lambda(h) and lambda still remains unresolved. However, the draft recovery plan misinterprets this distinction between lambda(h) and lambda in assigning habitat thresholds to provinces by stating "*…Franklin et al. (2000) and Olson et al. (2003)…found that landscape fitness (lambda*$_{(h)}$*) fell below 1.0 (a stable population) with greater than 80 percent nesting habitat and adult spotted owl survival rates were decreasing in landscapes with greater than 80 percent nesting habitat*" [pages 36 and 52 in draft recovery plan]. In this statement, lambda(h) is inappropriately used as a population, rather than a territory-scale individual, metric and, again, scale was misused (see previous comments). An additional reason why lambda(h) does not apply beyond a territory scale is because immigration and emigration are not included in the computation of lambda(h). At scales of multiple territories (e.g., in the MOCAs and habitat blocks proposed in the draft recovery plan), additional landscape considerations need to be included to account for dispersal of young of the year and movements by territory holders. This landscape matrix between territories was not included in the territory-scale lambda(h) estimated by Franklin et al. (2000) and was the reason why we stated on page 578 of Franklin et al. (2000): "*In addition, landscape extent in this study is limited to the territory scale and not to larger or smaller scales. Therefore, differences (or lack thereof) can only be attributed to the territory scale. Other scales such as a home range scale or cluster of territories may produce different results and should be appropriately analyzed*". To date, these analyses have not been conducted and, therefore, application of lambda(h) from the territory scale to blocks containing multiple territories is not appropriate.

Misinterpretation of Modeling Approach used in Franklin et al (2000):

In Appendix D, there are number of problems with the approach used to develop habitat-capable acres used in Recovery Criterion 4 under both Options 1 and 2. First, the regression of adult survival and lambda(h) against percent nesting habitat is not a correct analysis because:

1. The territory-specific adult survival was not strongly associated with just the amounts of older forest within territories but by the amounts of ***interior*** (emphasis mine), or core, older forest in addition to the amount of edge between older forest and other vegetation types (see Table 7 in Franklin et al. 2000). Interior older forest was the amount of older forest 100 meters from an edge and is very different than just the total amount of older forest within a territory. The model estimating survival based on just amounts of older forest was not well-supported and had only 3% of the weight in the model set (as opposed to 42.7% for the best-supported model described above; see Table 7 in Franklin et al. 2000).

2. The survival values used in the draft recovery plan were originally estimated based on the best-supported model in Franklin et al. (2000). In the draft recovery plan, these estimates were then regressed again on amounts of older forest in the draft recovery plan to develop optimal percentages of habitat capable acres. This was inappropriate because it ignores the model selection approach used in Franklin et al. (2000), which found that just amounts of older forest alone within spotted owl territories did not explain variation in survival nearly as well as amounts of interior older forest and edges.

These same problems carry through in the analysis of lambda(h) in the draft recovery plan because lambda(h) is a function of the survival estimates from the analysis described above. As noted in Franklin et al. (2000), territory-specific lambda(h) for northern spotted owls can be explained as follows: "*Survival seems positively associated with some level of interior mature and old-growth coniferous forest and the edge between those forests and other vegetation types, whereas reproductive output is enhanced by convoluted edge with little interior habitat. Thus, there is evidently a trade-off in potential need for interior habitat and potential need for ecotones within a territory. This trade-off was expressed in estimates of habitat fitness potential in Northern Spotted Owls, where high fitness balanced having both core owl habitat for maintaining high survival and having some mosaic of older forest and other vegetation types for maximizing reproduction and maintaining high survival. This mosaic was expressed as small patches of other vegetation types with convoluted edges, dispersed within and around a main patch of mature and old-growth forest*" [page 579 in Franklin et al. 2000]. Thus, the analysis provided in the draft recovery plan ignores this relationship between interior older forest and edges, and the subsequent stand configurations within

territories, that defined high estimates of lambda(h). Instead, the draft recovery plan and focused on an incorrect relationship with older forest alone. Although I initially provided some of these analyses to the recovery team at their request, I noted both verbally and in writing that these analyses were flawed for some of the above reasons.

The draft recovery plan proposes to use habitat fitness percentages as targets for the individual provinces across the range. What do you see are the risks or advantages of using the habitat fitness theory to establish habitat targets in relation to achieving the recovery criteria, specifically the population-related Recovery criteria (i.e., criteria #2 and #3).

I have a number of concerns in the use of the habitat fitness percentages in the draft recovery plan. First, the draft recovery plan misinterpreted a good deal of the information in Franklin et al. (2000) and the other studies in trying to apply these results to recovery criteria. I detailed these concerns in the first section of this letter. Thus, the targets provided in the draft recovery plan have serious flaws. Second, the study detailed in Franklin et al. (2000) was an observational study and the results should be considered more as explicit hypothesis that should have been subsequently tested by large-scale experiments. As noted in Franklin et al. (2000), "*Although these levels of uncertainty do not negate the results of this study, our results should be considered more as working hypotheses from an observational study that require further experimental verification. Clearly, part of the value of this work is in reducing the number of potential landscape configurations that might affect Northern Spotted Owls in this area to a small subset, which then can form the basis of field experiments*" [page 578 in Franklin et al. 2000]. To date these experiments have not been conducted, although they could have been on private lands.

I think that the use of habitat fitness theory is an integral part of managing any wildlife populations. Habitat is critical for maintaining wildlife populations and viable wildlife populations are dependant on habitat quality. One measure of habitat quality is habitat fitness, as used with northern spotted owls in the studies by Franklin et al. (2000), Olsen et al. (2004), and Dugger et al. (2005). However, these studies encompass only a few ecological provinces within the owl's range and data is specifically lacking for most of the provinces. As pointed out above, the results of these studies are preliminary until further experimentation is conducted. Although there was an attempt to include this in the draft recovery plan under Recovery Action 32 (*Conduct experiments on forest management outside of MOCAs to better understand the relationship between habitat and spotted owl fitness, including the effects of fire and silviculture on suitable habitat and spatial pattern*), this action was given the lowest priority classification (priority 3 – all other actions deemed necessary to meet the recovery objectives) [pages 78 and 90 in the draft recovery plan]. Given the importance of habitat to wildlife populations, such experiments should receive a priority classification of 1, especially because of the long time frames ($\geq$10 years) to obtain

meaningful results.

Thus, I have concerns that the results on habitat fitness from studies on northern spotted owls are incorrectly used in the draft recovery plan, and even if they were used correctly, there is no strong mechanism for validating their use in management in the near future.

The draft recovery plan specifically proposes habitat fitness percentage targets for each province. Given the proposed percentages (see pages 33 and 49) to what degree do you expect the recovery criteria to be met, specifically the population-related Recovery Criteria (Recovery Criteria #2 and #3)?

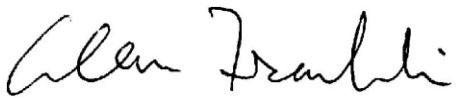
Based on my concerns outlined previously in this letter, I don't think that the habitat fitness percentage targets for each province are correct. Given this, it is impossible to say what degree the recovery criteria will be met because spotted owl population trends are implicitly linked with habitat conditions. One underlying factor that can affect spotted owl populations is weather, especially in combination with habitat quality as defined by habitat fitness. Franklin et al. (2000) found a relationship between habitat quality and climate where apparent survival declined 7.1% in good habitat as the climate conditions worsened, but decreased 17.5% and 26.3% in medium and poor habitats, respectively (see pages 575-576 and Figure 11 in Franklin et al. 2000). As noted in Franklin et al (2000), "*These results indicate that individuals in good habitat had a much slower decline in survival as climatic conditions deteriorated than did individuals in poorer habitats. Thus, high habitat quality, as defined in this study, buffered the survival of territory occupants from the negative effects of climate*" [page 576] and "*This also suggests that habitat maintenance is essential at landscape scales because excessive loss of key landscape habitat components, such as mature and old-growth forest, can exacerbate the effects of unfavorable climatic conditions on survival*" [page 582]. Thus, if poor measures are used to define and manage spotted owl habitat (i.e., are inadvertently managing for poor habitat quality), the underlying and uncontrollable effects of climatic variation could have severely detrimental effects on the population. Thus, habitat management for spotted owl populations proposed in the draft recovery plan is largely uncertain because, at the least, the measures of habitat fitness (and hence habitat quality) proposed in Franklin et al. (2000) were incorrectly applied to province-scale measures.

In conclusion, I think the recovery team should re-evaluate the use of habitat fitness in developing provincial targets and consider more rigorous modeling approaches to develop habitat fitness maps, similar to those developed by Zabel et al. (2003) for spotted owl occupancy, rather than simple threshold targets. In addition, a more prudent approach would include a stronger section on adaptive management experiments that tests the empirical models for habitat fitness in spotted owls from the observational studies. Although the effects of barred owls received considerable

attention in the draft recovery plan, consideration of habitat is still a primary and necessary requisite to recovering spotted owl populations and should be treated more rigorously in the final recovery plan.

Please let me know if you have any additional questions.

Sincerely,



Alan B. Franklin
Research Biologist
National Wildlife Research Center
Fort Collins, CO 80521